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REPORT ON WATER QUALITY INVESTIGATIONS OF SNAKE RIVER AND PRINCIPAL TRIBUTARIES FROM WALTERS FERRY TO WEISER, IDAHO

National Field Investigations Center
Denver, Colorado

February 1973

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Report on

WATER QUALITY INVESTIGATIONS OF SNAKE RIVER AND PRINCIPAL TRIBUTARIES WALTERS FERRY TO DOWNSTREAM FROM WEISER, IDAHO

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National Field Investigations Center-Denver
Denver, Colorado
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February 1973

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GLOSSARY OF TERMS

BOD - Biochemical Oxygen Demand, 5-Day

COD - Chemical Oxygen Demand

DO - Dissolved Oxygen

Kj - Kjeldahl Nitrogen as Nitrogen

LWK - Live Weight Killed

NH_3 - Ammonia as Nitrogen

NO_2 - NO_3 - Nitrite-Nitrate as Nitrogen

RM - river mileage

Total P - Total Phosphorus

TOC - Total Organic Carbon

TSS - Total Suspended Solids

WTP - Wastewater Treatment Plant

cfs - flow rate given in cubic feet per second

gpm - flow rate given in gallons per minute

mgd - flow rate given in million gallons per day

mg/l - concentration given in milligrams per liter

µmhos/cm - unit of specific conductance (mho -- the inverse of the standard unit of electrical resistance, the ohm) measured over a 1-centimeter distance, conventionally made at 25°C

I. INTRODUCTION

During the period 1964-1968 the Northwest Regional Office of the Federal Water Pollution Control Administration (FWPCA) conducted a study of water quality and pollution sources in the entire Snake River Basin. The objectives of the study were to determine the magnitude as well as sources of pollution and to develop water quality control and management programs for the Snake River Basin. Supplementary data were obtained from various local, State, and Federal agencies.

The FWPCA office compiled data from previous studies and prepared a report[1/] that outlined the problems associated with fish kills, algal blooms, bacterial contamination, thermal discharges, radioactive wastes, and pesticide contamination. Detailed conclusions were drawn and specific recommendations made for needed State and Federal actions. Waters of the study area were impaired for beneficial uses by the increasing pollution from industrial, municipal, and agricultural sources. The primary reason given for the gain in water pollution was poor management of various impoundments that drastically modified natural flow patterns and impaired assimilation of wastes. While secondary treatment, or its equivalent, would enhance water quality, maintenance of minimum stream flow was essential to proper, water quality management. As a result of this study and of implementation of water quality standards, there has been limited improvement in wastewater treatment.

At the request of the Environmental Protection Agency (EPA), Region X, the EPA National Field Investigations Center-Denver (NFIC-D) conducted waste-source evaluations and a water-quality and biological study of the

Snake River and principal tributaries between Walters Ferry (RM 442.5) and Weiser, Idaho (RM 350.3) [Figure 1, inside back cover]. The investigations were carried out from October 18 to November 10, 1971.

The tributaries evaluated include: Indian Creek, from upstream of Nampa to the Boise River; the Boise River, from upstream of Boise to its mouth; and the Payette River, from upstream of Emmett to its mouth.

The objectives were:

1. To determine whether interstate pollution occurs between Idaho and Oregon;
2. To evaluate water pollution control practices at principal industrial and municipal waste sources and to determine waste loads discharged;
3. To ascertain whether municipal and industrial waste discharges are in compliance with applicable water quality standards and regulations;
4. To determine the effects of industrial and municipal waste discharges to water quality and the aquatic biota;
5. To determine whether enteric pathogens contaminate these waters;
6. To provide a basis for evaluation of Refuse Act Permit applications; and
7. To determine the need for abatement measures.

Water quality and biological conditions observed during the stream survey are discussed in Section V. Waste source evaluations and pollution abatement needs are discussed in Section VI. [Water quality standards established by Idaho and Oregon for the Snake River and its tributaries are summarized in Appendices A and B, respectively. Study

methods and sampling locations are discussed in Appendices C and D, respectively. Physical, chemical, bacteriological, and biological data are presented in Appendices E through I. Waste source data are summarized in Appendix J. Proposed effluent guidelines for the major industrial waste categories relevant to this study are listed in Appendix K.]

The Federal Water Pollution Control Act Amendments of 1972 were enacted subsequent to the completion of the survey and preparation of the draft report. The document has, accordingly, been extensively revised to reflect the requirements of the 1972 Amendments.

Additional studies by EPA Region X and the Idaho State Board of Health are under way at this time. These studies may indicate that treatment requirements more stringent than those suggested herein, may be necessary in order to protect the receiving waters for their designated uses.

The cooperation of personnel of City, State, and Federal agencies, and industries, in supplying information and assistance is gratefully acknowledged.

II. SUMMARY AND CONCLUSIONS

1. Stream surveys, conducted from October 18 to November 10, 1971, on the Snake River from Walters Ferry (RM 442.5) to Weiser, Idaho (RM 350.0), revealed that water upstream of the Boise River (RM 391.3) was relatively unpolluted; however, bacterial standards were violated. In the reach of the Snake River between the mouth of the Boise River and Weiser, gross violations of the Idaho and Oregon Water Quality Standards that are applicable to the interstate waters of the Snake River were documented.

2. Downstream from the Boise River (RM 391.3) the water quality of the Snake River was degraded. Blue-green algae and slime growths were present because of excessive nutrient levels. While total-coliform bacterial densities increased 15-fold above levels upstream of the Boise River, fecal-coliform bacterial densities increased by more than a factor of 1,000; *Salmonella*, a pathogenic microorganism, was isolated. Coliform bacteria, discharged by municipalities and industries on the Boise River and Indian Creek, contributed to violations of Idaho and Oregon Water Quality Standards that are applicable to the interstate waters of the Snake River.

3. The Amalgamated Sugar Company at Nyssa, Oregon (RM 389.0), discharged untreated wastes containing an average BOD load of 13,800 lb/day (2.1 lb/ton of sugar beets), and excessive numbers of coliform bacteria were noted. This discharge greatly exceeded the waste loads that are permitted by the effluent guidelines proposed for the sugar beet industry [Appendix K]. The discharge also violated Oregon Water Quality Standards

that require secondary treatment or the industrial equivalent (85 percent removal of BOD and TSS). The numbers of coliform bacteria that were discharged contributed to the violation of Oregon and Idaho bacterial criteria applicable to the interstate waters of the Snake River. Company officials should be formally advised that permit conditions include limitations of BOD and suspended solids discharges each to 0.5 lb/ton of beets processed, requirement for disinfection, and may require containment during low-flow periods.

4. The quality of the Snake River water improved in the reach upstream of Ontario, Oregon, but was again degraded by waste discharges in the Ontario area.

5. The waste discharged from ORE-IDA Foods, Inc. (RM 370.0) contained a BOD of approximately 5,000 lb/day (6.2 lb/ton of vegetables). This discharge exceeded waste loads permitted by the proposed effluent guidelines for the fruit and vegetable canning and preserving industry. Moreover, this discharge violates the provision of the Oregon Water Quality Standards that requires secondary treatment or the industrial equivalent (85 percent removal of BOD and TSS). Numbers of coliform bacteria that were discharged contributed to the violation of Idaho and Oregon bacterial criteria applicable to the interstate waters of the Snake River. Company officials should be advised that the permit conditions for ORE-IDA Foods, Incorporated will be those provided by Schedule A, for the Canning, Preserved and Frozen Foods Processing Industry [Appendix K], and that disinfection of the effluent will be required.

6. Treatment and disinfection of municipal wastewaters by the City of Ontario were found to be adequate.

7. The Cities of Weiser and Payette, Idaho, provide only primary treatment of domestic wastes, thereby violating the Idaho Water Quality Standards requirements for "highest and best practicable treatment and control." City officials should be advised that Federal regulations are to be published requiring secondary treatment and disinfection by publicly owned wastewater treatment plants.

8. In the reach downstream from Weiser the water quality of the river was similar to that observed in the unpolluted upper portion of the study area.

9. The waters of Indian Creek upstream of Nampa, Idaho, were moderately degraded by wastes discharged from the Armour Meat Packing Company (RM 11.9) which discharged 92 pounds of BOD/day, equivalent to 0.22 lb/1,000 lb Live Weight Killed (LWK). This discharge of BOD exceeds the waste loads that are permitted by the proposed effluent guidelines (0.17 lb BOD/1,000 lb LWK). The discharge also violates Idaho Water Quality Standards that require secondary treatment or the industrial equivalent (85 percent removal of BOD and TSS). Densities of coliform bacteria contained in the Armour effluent contributed to violations of the bacterial criteria that are applicable to Indian Creek and the Boise River. Studies currently in progress may indicate the need for containment and/or re-use of this wastewater.

10. The Nampa municipal wastewater treatment plant, during the time of the survey, was the principal source of the pollution of Indian Creek.

The plant was organically overloaded because of inadequately pretreated industrial waste loads. This plant was removing only 72 percent of the influent BOD load. Excessive numbers of total- and fecal-coliform bacteria, 1,200,000 and 96,000/100 ml, respectively, were being discharged to Indian Creek. The discharge of inadequately treated and poorly disinfected municipal and industrial waste caused violations of the Idaho Water Quality Standards pertaining to turbidity, odors, sludge banks, dissolved oxygen, bacteria, and to the requirement for "highest and best practicable treatment and control." Bacterial contamination also contributed to violations of the bacterial standards for the Boise River and for the interstate waters of the Snake River. In order to comply with applicable water quality standards, as indicated by the results of this survey, the City of Nampa must provide a very high degree of removal of BOD and TSS. Preliminary, computer-model results, based on the best available hydrologic information, indicate that the necessary treatment level will require an alternative comparable to complete containment and re-use of wastewaters, change in the point of effluent discharge, or interception and treatment at the Caldwell Wastewater Treatment Plant (WTP). This type of treatment measure is necessary to prevent water-quality degradation of Indian Creek during periods of low flow.

11. Boise River, upstream of Boise, Idaho, was of good water quality. Downstream from the city of Boise discharges of municipal and industrial wastewaters, plus inflow from Indian Creek, caused violations of dissolved oxygen and bacterial standards.

12. The Boise (municipal) WTP provided marginally adequate treatment; disinfection was not adequate. City officials should be advised that Federal regulations are expected to limit fecal-coliform bacterial densities in the discharge to weekly and monthly averages of 400 and 200 per 100 ml, respectively.

13. Treatment and disinfection of municipal and industrial wastewaters by the Caldwell WTP was inadequate. The BOD removal was approximately 68 percent; the effluent contained levels of total- and fecal-coliform bacteria of 18,000 and 1,100/100 ml, respectively. Therefore, the discharge from this plant violated Idaho Water Quality Standards pertaining to bacterial densities and treatment levels. In order to comply with applicable water-quality standards the results of this survey indicate that the City of Caldwell must provide a high degree of removal of BOD and TSS. To prevent water-quality degradation the Idaho State Board of Health is recommending that the effluent discharged from the Caldwell WTP contain no more than 1,000 lb/day of BOD. To attain this level of treatment may require complete containment and re-use of wastewaters. City officials should be advised that disinfection must be provided such that the total-coliform bacterial densities do not exceed 1,000/100 ml, and the fecal-coliform bacterial densities do not exceed weekly and monthly averages of 400 and 200/100 ml, respectively. Further, ordinance(s) must be enacted to implement Federal regulations pertaining to pretreatment of industrial wastewaters discharged to publicly owned wastewater treatment systems, and that a schedule, acceptable to State and Federal authorities, must be developed to attain compliance with the ordinance(s).

14. Wastewaters discharged by the J. R. Simplot Company potato-processing plant contained an average BOD load of 30,800 lb/day (13.7 lb/ton of raw potatoes), thus greatly exceeding effluent loads permitted by the proposed effluent guidelines [Appendix K]. This discharge caused violations of the DO standards for the Boise River. The effluent contained very high levels of total- and fecal-coliform bacteria, 1,500,000 and 64,000 per 100 ml, respectively, contributing to violations of bacterial standards in the Boise and Snake Rivers. Attainment of effluent quality prescribed by the effluent guidelines cannot be expected to protect water quality in Indian Creek. Additional treatment or containment/re-use will be required.

15. The Garden City and Meridian municipal wastewater treatment plants attained BOD removals of 33 and 63 percent, respectively. Disinfection, by the Garden City WTP was inadequate. City officials should be advised that disinfection must limit total-coliform bacterial densities to 1,000 per 100 ml and fecal-coliform bacterial densities to weekly and monthly averages of 400 and 200 per 100 ml, respectively. Studies now in progress could require that these communities provide additional treatment to protect water quality of the receiving stream.

16. The Triangle Dairy discharged wastewater to the Boise River through a drainage ditch. Levels of total- and fecal-coliform bacteria present in the effluent were 3,300,000 and 7,700/100 ml, respectively. This discharge contributes to violations of the bacterial criteria for the Boise and Snake Rivers. Adequate disinfection or containment is required in order to eliminate this standards violation.

17. Discharge, by the Boise-Cascade Corporation, of untreated wastewaters to the Payette River violates the Idaho Water Quality Standards requirement for "highest and best practicable treatment and control." The small quantity of wastewater involved suggests containment or re-use.

III. DESCRIPTION OF THE AREA

Headwaters of the Snake River are in the high, rugged Teton Mountains of northern Wyoming. The river flows in a southwesterly curving arc across southern Idaho to the Oregon border, near its confluence with the Boise River. At this point the Snake turns north and forms the Oregon-Idaho boundary for 216 miles. From the northeast corner of Oregon to Lewiston, Idaho, this river forms the Washington-Idaho boundary and then turns west to join the Columbia River. The Snake River is the largest tributary of the Columbia River, with a total length of 1,038 miles, draining an area of 109,000 square miles.

The study area [Figure 1, inside back cover], i.e. the Snake River Plain, is characterized by gently rolling hills. Until the widespread use of irrigation this plain was semi-arid; today it has been transformed into a highly productive farming area. The flood plain and valleys formed by the Boise, Payette, and Weiser Rivers are used extensively for farming and ranching. Crops produced include potatoes, onions, sugar beets, beans, alfalfa, wheat, and hay. Truck and fruit farming flourish along the Idaho-Oregon border. Beef and dairy cattle and sheep are raised extensively.

Although the economy of the area is primarily agricultural, industrialization is expanding rapidly, with accompanying growth of urban areas. The principal urban centers in the study area are: Boise, Idaho with a population of approximately 90,000; Nampa, Idaho, with 21,000; Caldwell, Idaho, with 14,000; Ontario and Nyssa, Oregon, with a combined population of 9,100; and Payette, Idaho, with 4,500. The development has resulted in an expanded and intensified use of the Snake River and its principal tributaries, particularly the Boise River.

IV. STREAM SURVEY

A. INDIAN CREEK

Indian Creek, a tributary of the Boise River, originates south of Boise, Idaho. The upper reach of the creek is impounded by the Indian Creek Reservoir. Downstream from the dam the stream flows northwest past the towns of Nampa and Caldwell, Idaho, to its confluence with the Boise River.

Upstream of the Armour Meat Packing Company, at RM 11.9,* the BOD values and TOC concentrations were moderately high [Table E-1], as expected in an agricultural area. Dissolved oxygen ranged between 8.8 and 10.8 mg/l (80 to 109 percent saturation), exceeding the DO criterion (75 percent saturation) established by Idaho. The stream bottom was sandy and free from sludge. The benthos reflected these conditions of good, but slightly enriched, water quality. Organic pollution-sensitive mayflies and caddisflies were common in the diverse benthic community, which also contained organisms that prefer an enriched environment [Table I-1].

Downstream at RM 11.2, the Armour Meat Packing Company discharged untreated cooling water directly to Indian Creek. Process waste was treated in a two-cell lagoon prior to discharge. The combined load discharged to the creek averaged 92 lb BOD/day. Total- and fecal-coliform bacterial densities in the discharge averaged 17,000/100 ml and 3,800/100 ml, respectively. At RM 10.4, dissolved oxygen ranged from 8.3 to 10.4 mg/l (84 percent saturation or better) and TOC values were within the same range as that recorded upstream from the Armour Company wastewater

* Mileage is measured from the mouth of Indian Creek.

discharge. The benthos was dominated by pollution-tolerant flatworms and sludgeworms. The numbers of benthic organisms increased moderately to 1,954/ft^2, and diversity decreased from 14 kinds upstream to nine in this reach [Table I-1]. Water quality in this reach was judged to be moderately degraded.

From RM 10.4 to 7.5 Indian Creek flows through a residential area of Nampa. At RM 7.5 the DO levels, slightly lower than they were upstream, ranged from 8.2 to 9.4 mg/l (89-95 percent saturation). Densities of total- and fecal-coliform bacteria in this reach were 14,000/100 ml and 350/100 ml,* respectively [Table F-1 and Figure 2]. The Idaho standard for bacteria, applicable to all waters of the State, was violated. The Nampa (municipal) Wastewater Treatment Plant discharges treated sewage and food-processing wastes to Indian Creek at RM 7.4. Downstream at RM 5.0 the creek was turbid, gray in color, and smelled of sewage. The biochemical oxygen demand averaged 13 mg/l. Dissolved oxygen concentrations decreased to 3.2 mg/l (34 percent saturation). Total- and fecal-coliform bacteria numbered 30,000/100 ml and 900/100 ml, respectively. The stream bottom was blanketed with organic sludgebeds and supported only benthic organisms tolerant of organic pollution. Sludgeworms, numbering over 40,000/ft^2, constituted more than 99 percent of the benthos. The diversity decreased to only six kinds of tolerant organisms. Idaho Water Quality Standards were violated in this severely polluted reach of Indian Creek: Section 5-B, F, and G, prohibit excessive turbidity, odors, and the buildup

* Except where otherwise noted densities of coliform bacteria are expressed are arthimetic means.

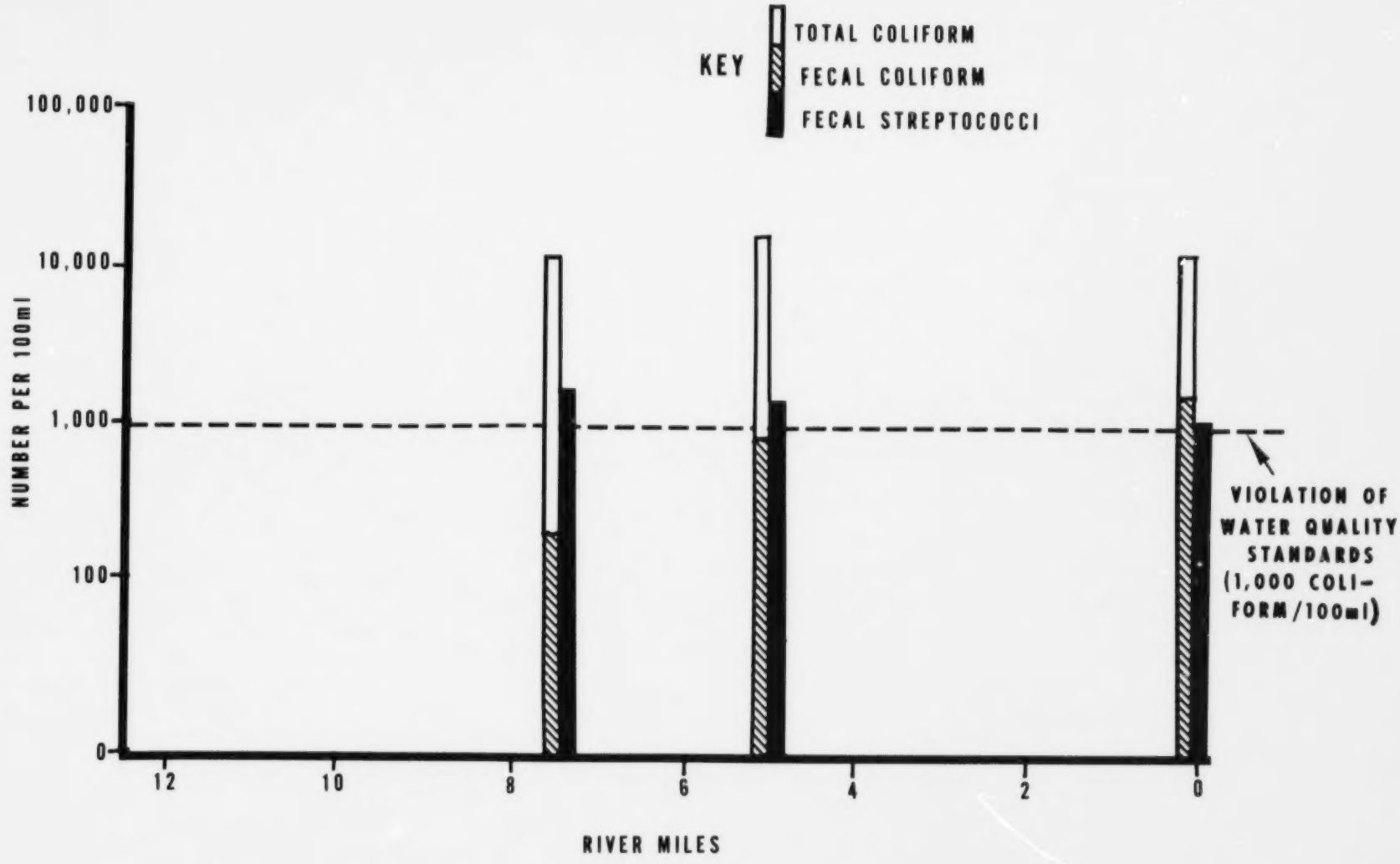


Figure 2. Bacterial Densities, (Arithmetic Mean) Indian Creek, Idaho. November, 1971

of sludgebanks; dissolved oxygen concentrations were consistently lower than are permitted; and coliform densities exceeded the Idaho maximum criterion.

Downstream at RM 2.8 Indian Creek waters recovered to some extent from the damaging effects of wastes discharged at Nampa, although they were still degraded. The BOD was 9 mg/l; DO concentrations increased slightly to a range of 3.6 to 6.4 mg/l (40 to 65 percent saturation). The benthic community was dominated by tolerant sludgeworms and flatworms, but the density of the organisms decreased drastically to only 64/ft^2. Pollution-sensitive mayflies and caddisflies inhabited the reach, and diversity increased to 11 kinds [Table I-1].

Water quality near the mouth of Indian Creek (RM 0.1) improved but was still in a degraded condition. Levels of BOD and TOC decreased to about 7 and 5 mg/l, respectively, and DO levels increased to more than 75 percent saturation [Table E-1]. Densities of coliform bacteria continued to be excessive (total coliforms, 18,000/100 ml; fecal coliforms, 2,500/100 ml) in this reach [Table F-1]. Benthos typical of a recovery zone of an organically polluted stream inhabited this reach. Sludgeworms and flatworms were uncommon, their numbers being replaced by blackflies and midges [Table I-1]. Pollution-intolerant caddisflies inhabited the reach; the density of organisms decreased to 53/ft^2. Despite these improvements in the quality of Indian Creek waters, they carried an estimated 10,900 lb BOD/day to the Boise River.

No historical, hydrologic records for Indian Creek were available to indicate low-flow frequencies. Therefore, present and projected effects of waste discharges were calculated on the basis of estimated flows.

Estimates of waste-load assimilative capacities were made based on best available hydrologic information. Preliminary computer model results, based on estimated flows, indicated that a maximum of 1,000 lb/day of BOD can be discharged from this wastewater treatment plant. Hydrologic studies should be initiated in order to provide the basis for decisions regarding permitted discharges to Indian Creek. Such studies are expected to indicate that installation of best available treatment, by dischargers to Indian Creek, will not preclude violations of DO standards (75 percent saturation) during low-flow periods. Containment and re-use of wastewater may be necessary in order to prevent water quality standards violations.

In summary, from RM 11.9 to RM 7.5 Indian Creek was moderately degraded by wastes discharged from the Armour Meat Packing Company and untreated domestic wastes discharged in Nampa. Idaho bacterial criteria were violated at RM 7.5. From RM 7.5 downstream to RM 2.8, treated domestic and food-processing wastes discharged from the municipal wastewater treatment plant, at Nampa, caused violations of the standards for turbidity, odors, sludgebanks, dissolved oxygen, and bacteria. Although the stream assimilated some of the waste load, it contributed nearly 11,000 lb BOD/day to the Boise River and also contributed to violations of bacterial standards in the river.

B. BOISE RIVER

The headwaters of this river are at the confluence of the North, South, and Middle Forks Rivers. The Boise River flows west, through the cities of Boise and Garden City, and continues westward past Caldwell, Notus, and Parma, Idaho, to join the Snake River downstream from Parma.

During the survey (November 4-10, 1971) stream flows varied from 106 cfs at RM 52.8 in the city of Boise to 885 cfs at Notus, Idaho (RM 13.8). The flow at Boise was 30 percent of the historical average for October and November, while at Notus it was 30 percent greater than this average. Streamflow in the upper reach is controlled by releases from both Lucky Peak and Barber reservoirs. Flows increased downstream at Notus because of groundwater accretions, irrigation returns, and waste discharges. Abnormally high groundwater levels[2/] at the time of the survey increased the accretion rate.

From Eckert Road Bridge (RM 58.2), upstream of Boise, to RM 52.8 the Boise River was clear and of good water quality [Table E-2]. Bacterial pollution was not evident [Table F-2 and Figure 3]. These conditions favored the development of a benthic community that included pollution-sensitive mayflies and caddisflies [Table I-2]. Growths of attached algae were nominal and no slimes were found [Table C-1 and Figure 4]. Rainbow trout, exposed in cages, acquired no off-flavors and remained palatable [Table H-3]. A diverse population of game and non-game fish, including rainbow trout, was collected by electroshocking [Table H-1].

The effects of the waste discharges in the Boise area were evident at the Strawberry Glen Bridge (RM 47.1). The Garden City (RM 48.0/0.8) and Boise (RM 49.1) municipal wastewater treatment plants discharged a combined load of approximately 15,300 lb BOD/day. Total phosphorus increased to 0.60 mg/l in this reach, 15 times the concentration found at RM 52.8. Total- and fecal-coliform bacterial densities were 15,000/100 ml and 6,600/100 ml, respectively, (in violation of the bacterial standard).

Salmonella infantis and *S. typhimurium* were isolated at this location. Dense mats of algae and slime were evident, thus constituting a violation of Section 5E of the Idaho General Water Quality Standards for Waters of the State. The benthic community was rich in kinds (15 types), but was dominated by hydropsychid caddisflies (85 percent). The same types of fish, including rainbow trout, were found here as at RM 58.2. Trout, exposed for palatability tests, were found undesirable for human consumption [Figure 5].

There was a partial improvement in water quality downstream from Star, Idaho (RM 33.9). Numerous riffles increased the turbulence, and stream aeration increased (DO ranged between 9.0-13.0 mg/1). The diversity of the benthic community (14 kinds) remained essentially the same as that found at the Strawberry Glen Bridge. However, the total numbers present were reduced from 1,468/ft^2 to 195/ft^2 because of the significant reduction in the number of hydropsychids. Trout exposed at this location acquired an undesirable taste.

Near Middleton, Idaho (RM 26.5), the trend toward recovery continued. Levels of dissolved oxygen remained high, ranging from 9.5 to 14.8 mg/1. The benthos was similar to that found near the town of Star. Mountain whitefish and large-scale suckers were collected by electroshocking.

Upstream of Caldwell, Idaho (RM 21.8), patches of attached algae, mixed with slimes, covered portions of the river bed, in violation of general standards that prohibit slime growths. Such growths were not widespread. The benthos was diverse (15 kinds), and the density of organisms remained low. *S. dublin* was isolated at this location.

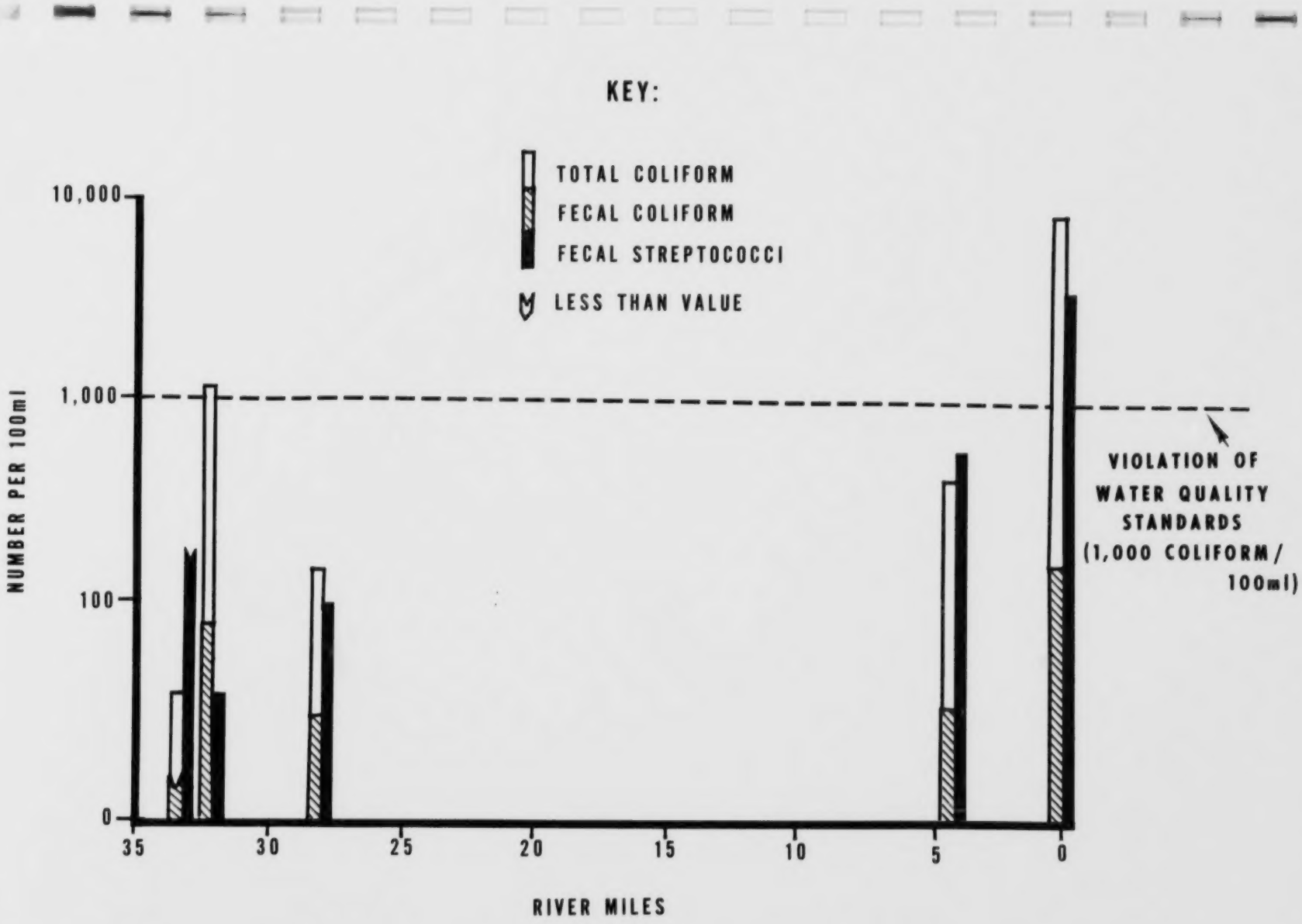


Figure 3. Bacterial Densities,(Arithmetic Mean)Payette River,Idaho.October-November,1971

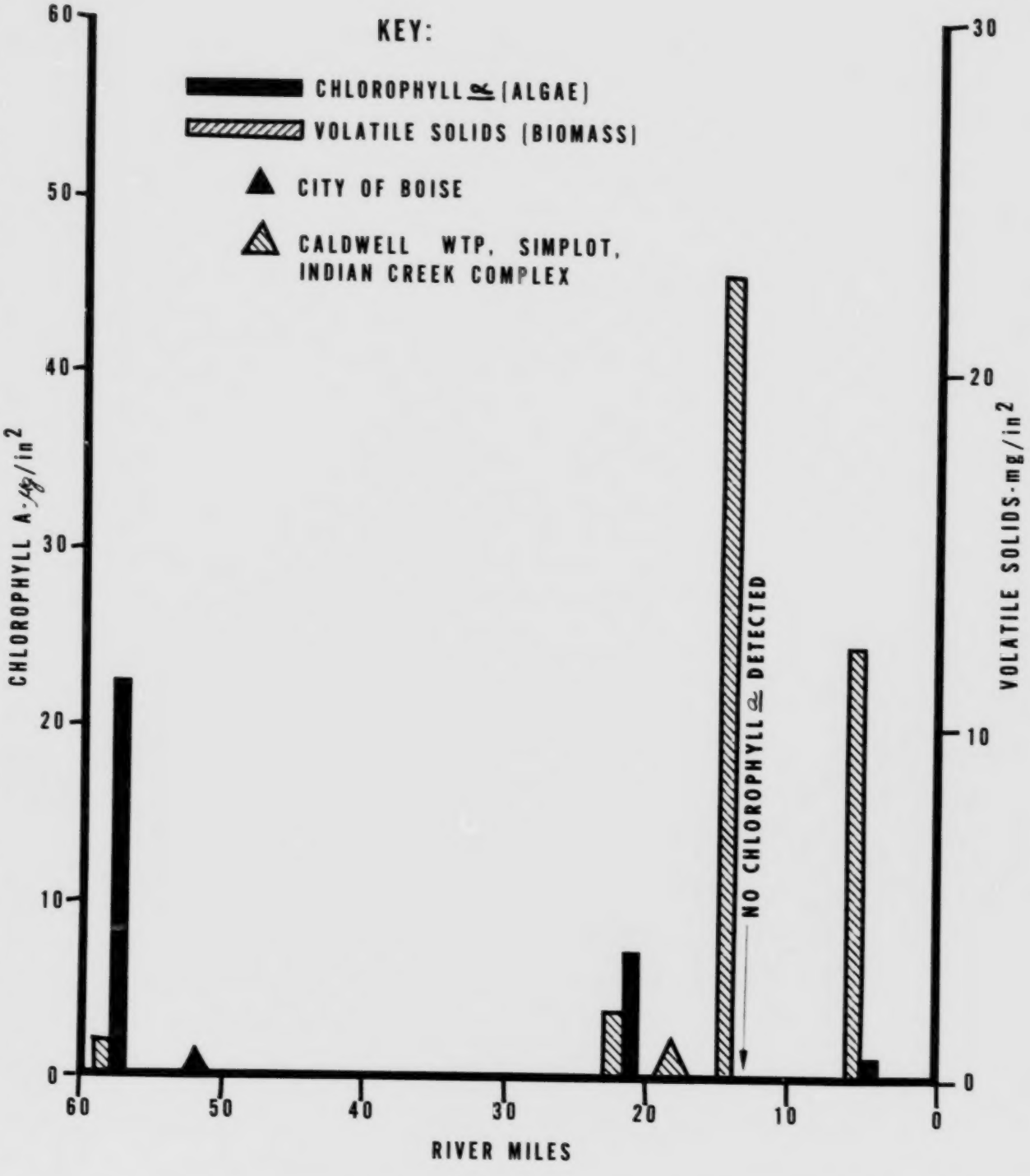


Figure 4. Algae (Chlorophyll a) and Biomass (Volatile Solids) Boise River, Idaho November, 1971

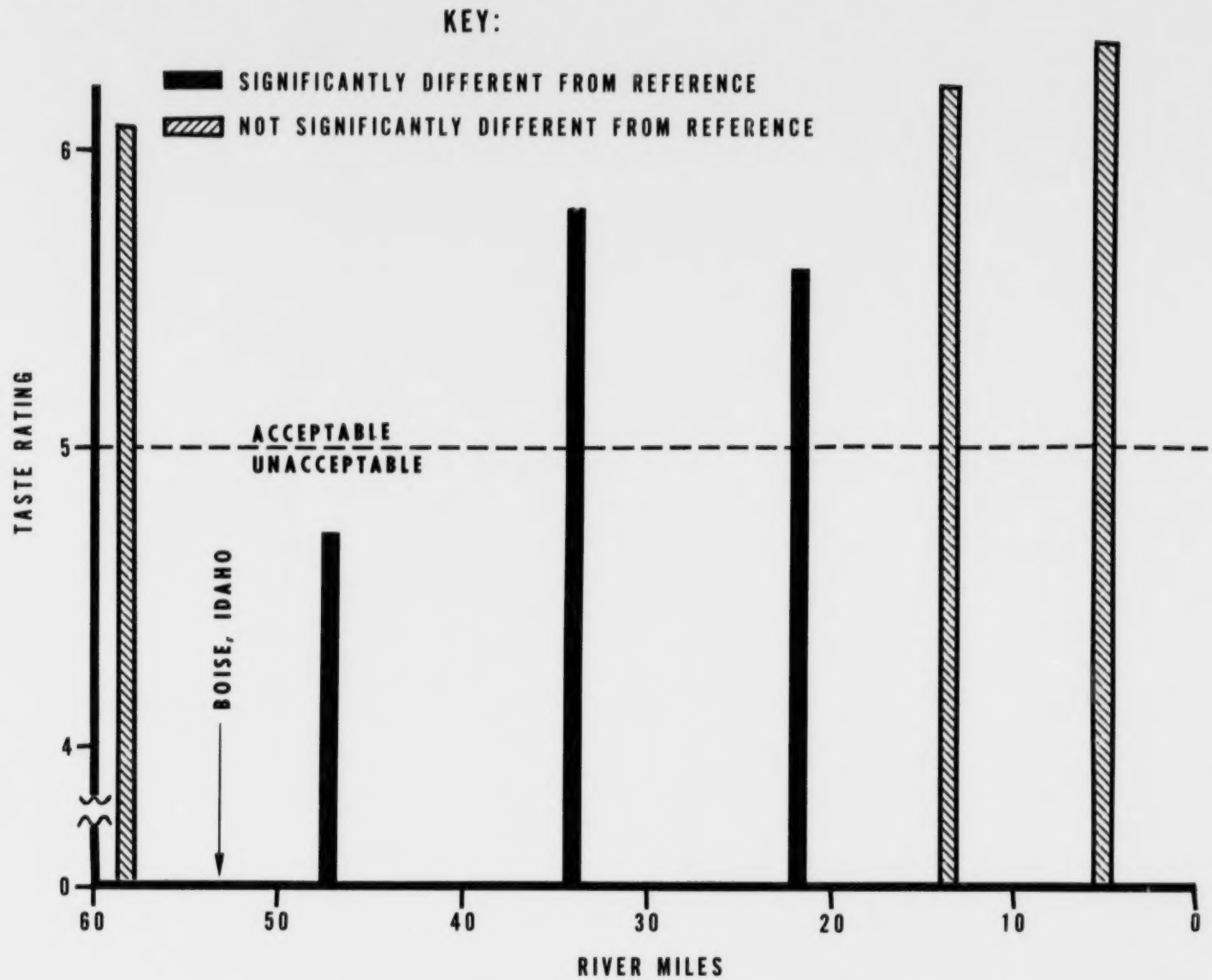


Figure 5. Rainbow Trout Flavor Test Results, Boise River, Idaho
November, 1971

Total- and fecal-coliform bacterial densities averaged 2,400/100 ml and 490/100 ml, respectively, a violation of the bacterial criteria.

At RM 17.7, upstream of the J. R. Simplot potato-processing waste discharge, water quality was affected by the waste load from the Caldwell (municipal) WTP (RM 19.8) and the waste inflow from Indian Creek (RM 19.7). Daily discharges from the Caldwell treatment plant and Indian Creek were about 2,000 lb and 11,000 lb of BOD, respectively. The density of total-coliform bacteria in the Boise River at 27,000/100 ml was ten times greater than the density found at Caldwell and was in violation of the Idaho bacterial criteria. The DO levels remained high (9.4-10.3 mg/l).

The J. R. Simplot Company (RM 17.6) discharged wastes on a periodic basis (batch discharges for 3-hr periods, twice daily). The quantity of water discharged averaged 4.3 mgd and contained 30,800 lb BOD. Total- and fecal-coliform bacterial densities in the effluent were 1,500,000/100 ml and 63,000/100 ml, respectively.

The effect of the waste discharged from the J. R. Simplot Company on water quality was determined by sampling the river under two conditions, waste discharge (allowing for flow time from the point of discharge) and no-waste discharge [Table 1]. Downstream at Notus (RM 13.8), under no-discharge conditions, water quality was similar to that measured upstream at RM 17.7. During discharge conditions the BOD levels increased from 5.3 to 13 mg/l and the DO levels ranged between 6.4 and 7.8 mg/l. These levels of dissolved oxygen (60-68 percent saturation) constituted a violation of the Idaho standards. The density of total-coliform bacteria

TABLE 1

EFFECT OF J. R. SIMPLOT COMPANY WASTE DISCHARGE
ON WATER QUALITY, BOISE RIVER
NOVEMBER 4-10, 1971

Parameter (unless otherwise noted all units are mg/l)		Upstream of J.R. Simplot Co. (RM 17.7)	Notus, Idaho (RM 13.8)	
			No-Discharge Condition	Discharge Condition
DO	Range	9.4-10.3	9.0-10.4	6.4-7.8
	Average	9.9	9.8	7.1
DO % Sat.	Range	85-97	89-97	60-68
	Average	91	92	64
BOD	Range	4.1-4.8	3.1-7.4	13[a]
	Average	4.4	5.3	13
TOC	Range	3-5	2-4	6
	Average	4	3	6
Kj Nitrogen as N	Range	0.1-0.6	0.2-0.5	0.4-1.9
	Average	0.4	0.4	1.0
NH_3-N	Range	<0.1-0.1[b]	<0.1-0.1[b]	<0.1-0.5[c]
	Average	0.1	0.1	0.3
NO_2-NO_3-N	Range	1.70-2.20	1.77-2.20	1.66-2.00
	Average	1.95	2.00	1.79
Total P	Range	0.38-0.45	0.41-0.45	0.65-0.76
	Average	0.42	0.43	0.69
Total coliforms[d]	Range	4,500-76,000	2,300-22,000	>80,000-260,000
	Average	27,000	10,000	140,000
Fecal coliforms[d]	Range	320-1,300	100-500	1,600-9,300
	Average	950	320	5,100
Fecal streptococci[d]	Range	470-1,800	450-2,100	2,100-21,000
	Average	1,100	1,000	10,000

a/ This is a single value.
b/ Two values are less than 0.1.
c/ One value is less than 0.1.
d/ This value is reported as count/100 ml.

increased from 10,000 to 140,000/100 ml during discharge, thereby contributing to violations of Idaho standards. *S. dublin* was isolated, indicating sewage contamination.

Pollution-tolerant sludgeworms and dipterans increased from 61 percent at RM 21.8 to 89 percent at Notus. Diversity decreased (16 to 12 kinds), while the total population increased (114/ft^2 to 1320/ft^2). Increased turbidity in the river favored development of non-chlorophyll-bearing slimes and a corresponding decrease in algal growths.

At Parma (RM 5.0) the water quality was similar to that found at Notus [Tables E-2 and F-2]. On several occasions during the survey the total-coliform bacteria density was 26,000/100 ml and the DO levels were below 75 percent saturation; both were in violation of Idaho standards. The benthic community was dominated (87 percent) by pollution-tolerant sludgeworms and dipterans (density, 94/ft^2). No game fish were found at this station. Rainbow trout exposed for palatability tests were judged suitable for consumption.

Conditions at the mouth of the Boise River were similar to those at RM 5.0. Densities of bacteria violated the standards. *S. newport* was isolated. The benthos was extremely sparse (7/ft^2). Mountain whitefish (a game fish), carp, and suckers were collected by electroshocking.

In summary, the Boise River was degraded by the waste discharges in the Boise and Caldwell areas, and by waste inputs from Indian Creek. Violations occurred of the bacterial and DO standards and the general standards applicable to the Boise River. Bacterial densities in the Boise River contributed to violations of Idaho and Oregon Water Quality Standards for the interstate waters of the Snake River.

C. PAYETTE RIVER

The headwaters of the Payette River are in the Sawtooth mountains, northeast of Emmett, Idaho. The stream flows south and then westward through the town of Emmett [Figure 1]. About 20 miles downstream from Emmett the river flows to the northwest. The confluence of the Payette River with the Snake is near the town of Payette.

A stream survey was conducted from upstream of Emmett (RM 33.3) to the confluence. Water quality in the study reach was good [Tables E-3 and I-3]. Downstream from Emmett (RM 28.0) the river bed of rocks and cobbles was free from sludge deposits. It supported a diverse benthic community that included many forms sensitive to pollution, such as mayflies and caddisflies [Table I-3].

Downstream from RM 4.1 wastewaters from both the Payette municipal treatment plant and a small sanitation district plant (Gayway) discharge to the Payette River. Except for a significant increase in the densities of total coliform bacteria (660 to 9,600/100 ml), the quality remained essentially the same at RM 0.1. The Payette River, throughout the study reach, supported a diverse benthic community including many forms sensitive to pollution. In summary, the Payette River was of good quality and did not cause violations of water quality standards in the Snake River.

D. SNAKE RIVER

From Walters Ferry (RM 442.5) the Snake River flows first northwest to Adrian, Oregon (RM 401.8) and then north, forming the Idaho-Oregon state line [Figure 1].

The streamflows, measured at Weiser, Idaho, averaged 25,200 cfs during the survey period, October 27 to November 2, 1971. The flow rate was twice the historical average for the months, October and November; flow was 120 percent greater than the record high (62 years) for October. High-flow conditions hampered biological sampling and precluded fish population studies. Swift currents also prevented quantitative sampling of the resident benthos in the natural bed of the river.

Qualitative benthos samples were collected from inundated shoreline vegetation and by use of artificial substrates. In the evaluation of water quality these samples were of limited value because they represented organisms in catastrophic drift conditions rather than the resident benthos. Algal growths attached on the artificial substrates were inhibited both by reduced light penetration and by the scouring action of the turbid waters. These high-velocity currents also caused mortalities among caged trout exposed for palatability tests.

The Snake River from RM 442.5 downstream to RM 401.8 was relatively unpolluted [Table E-4]. The flavor of trout exposed at control stations (RM 416.0, 401.3, and 393.0) was acceptable and did not differ significantly from that of the reference fish [Figure 6]. Sparse aquatic growths (volatile solids <0.58 mg/in.^{2}) collected by artificial substrates consisted of green algae and numerous diatoms [Table G-2]. Both the diverse community of these kinds of algae and the absence of slime growths indicated that this reach was unpolluted. However, total-coliform bacterial densities in the reach [Table F-4 and Figure 7] exceeded the values established in Idaho standards.

The Owyhee River discharges to the Snake River, downstream from Adrian, at RM 392.3. As mentioned previously, benthic sampling of the Snake River was hampered by high streamflow. However, the benthos in the tributaries, in the study reach, was sampled adequately. The Owyhee River at RM 2.9 had a shifting sand and silt bottom. The density of benthic organisms was low and they were dominated by sludgeworms and midge larvae [Table I-4]. A few pollution-tolerant mayflies were present. This river was judged to be enriched by organic materials. Densities of total- and fecal-coliform bacteria were 1,700 and 74/100 ml, respectively.

The Snake River (RM 390.5) downstream from the mouths of the Owyhee and Boise Rivers contained sufficient soluble nutrients (average total P, 0.10 mg/l and average NO_2-NO_3, 1.12 mg/l) to sustain dense aquatic growths on the artificial substrates placed on the Idaho side of the Snake River. [The increase in biomass along the Idaho shoreline is depicted in Figure 8.] This biomass was principally composed of organic pollution-indicator organisms including blue-green algae and slime bacteria, constituting violations of the Idaho general standards. Bacterial densities [Table F-4] greatly exceeded the Idaho and Oregon standards applicable to the interstate waters of the Snake River. The pathogenic bacteria, *Salmonella enteritidis*, *S. newport*, and *S. typhimurium*, were isolated from the reach, indicating fecal contamination. Trout exposed at this station acquired an unacceptable off-flavor.

At RM 389.0, upstream of Nyssa, Oregon, the Idaho and Oregon bacterial standards were also exceeded. The chemical quality of the water was similar to that found at RM 390.5.

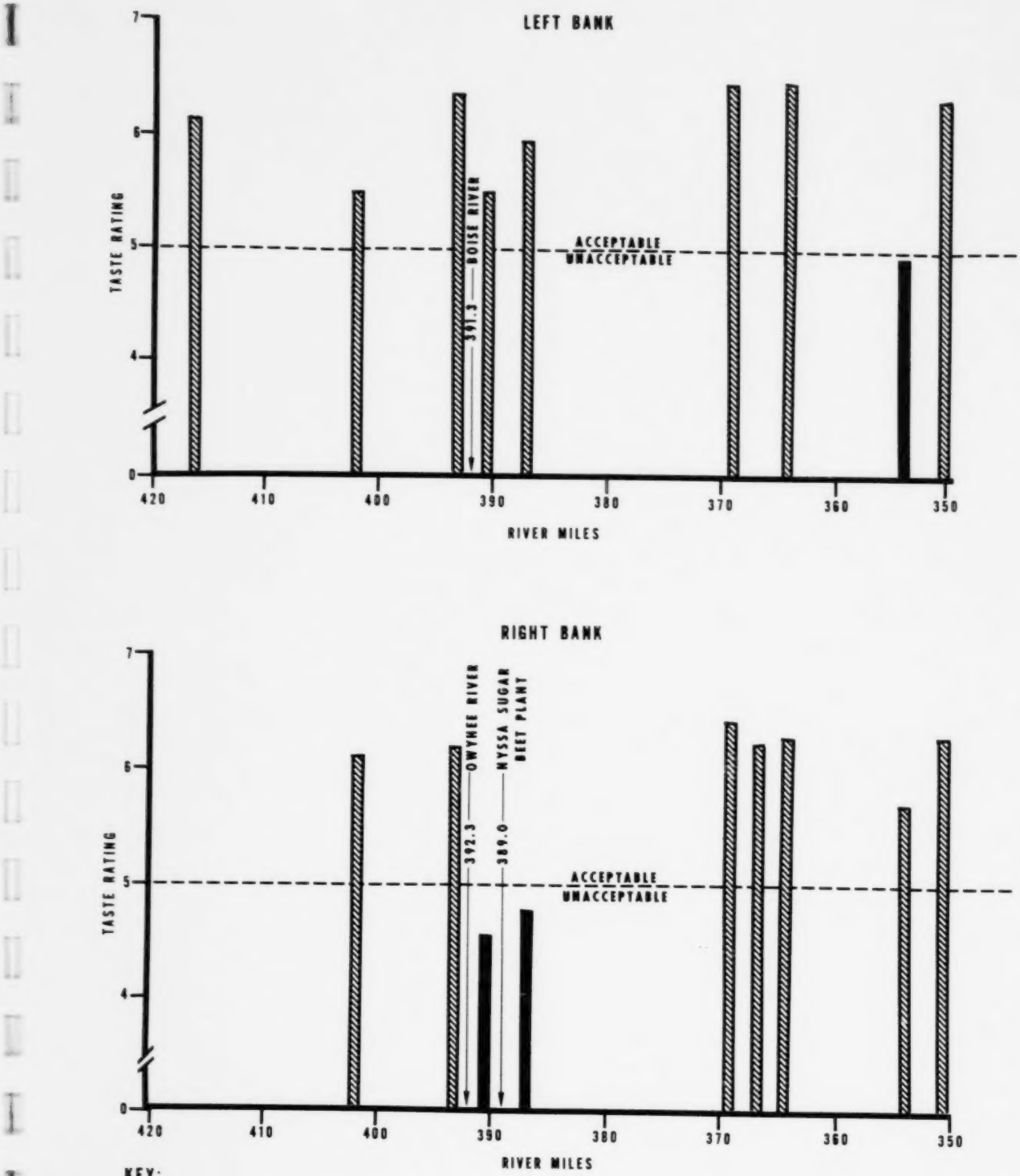


Figure 6. Rainbow Trout Flavor Test Results, Snake River, November, 1971

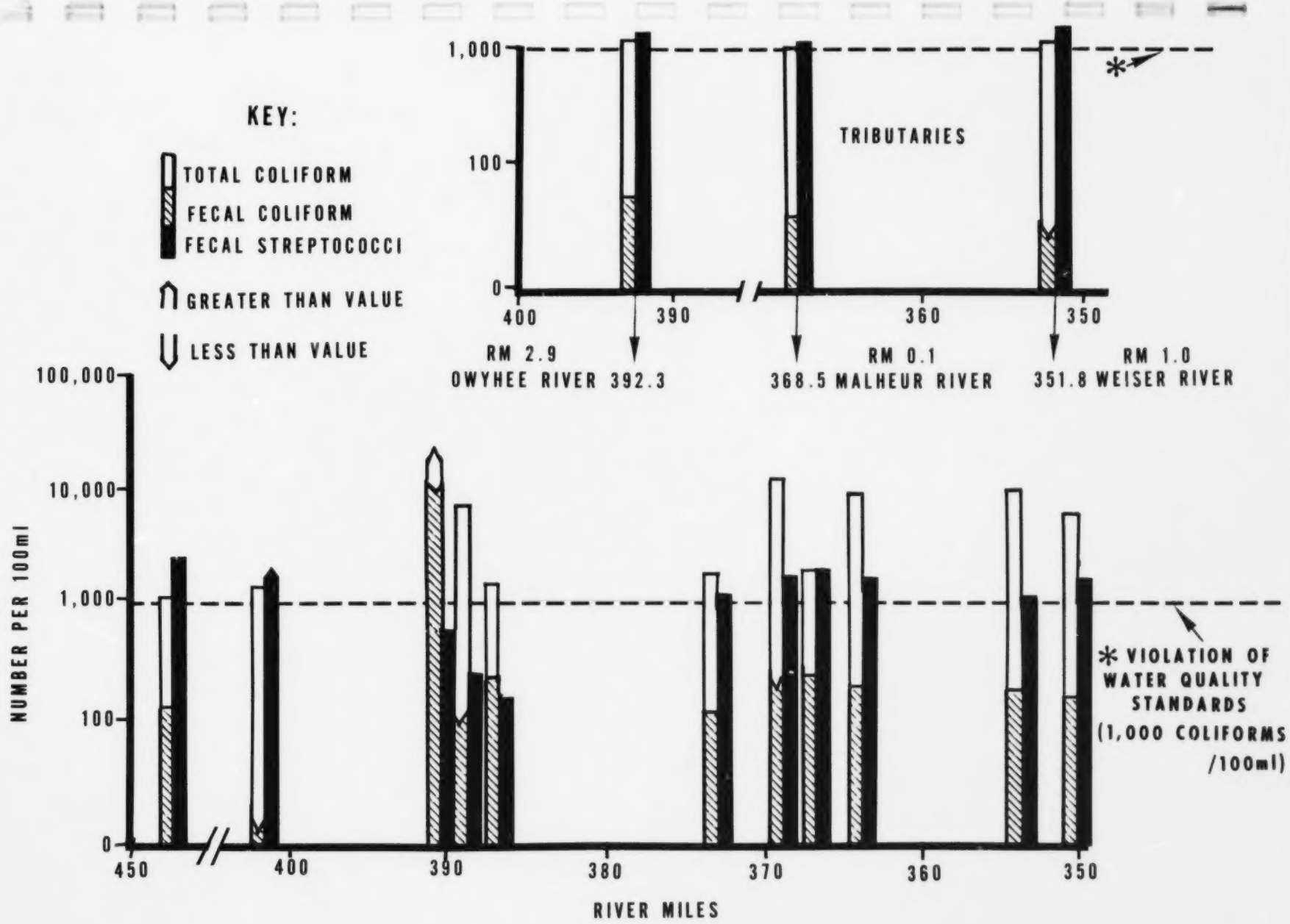
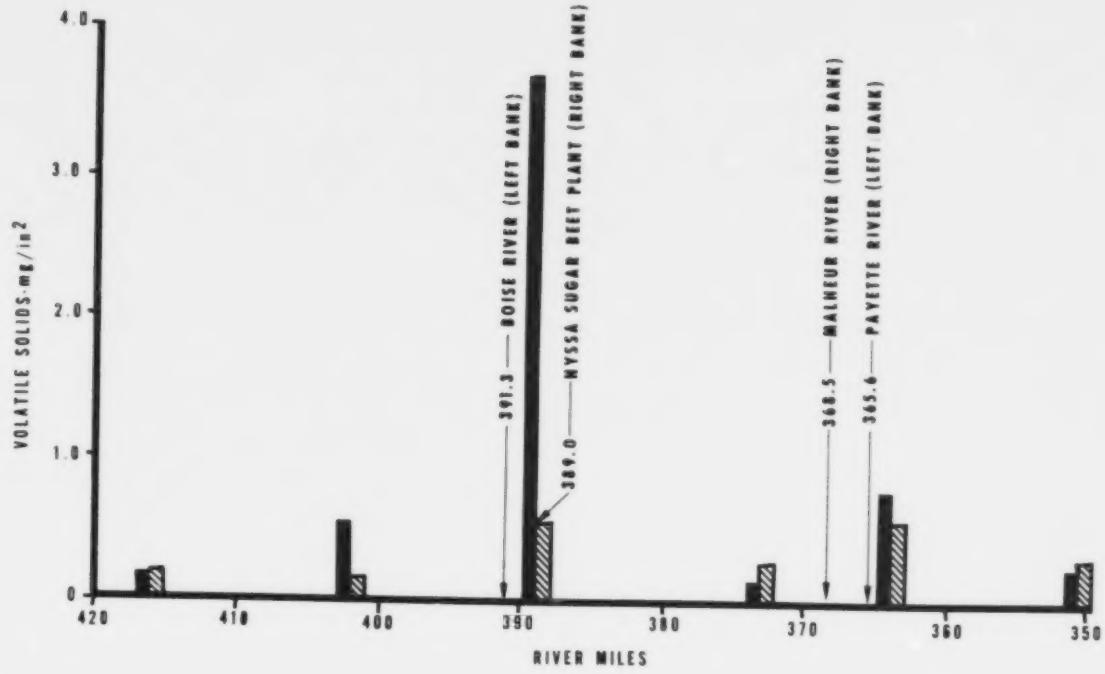


Figure 7. Bacterial Densities, (Arithmetic Mean) Snake River October- November, 1971



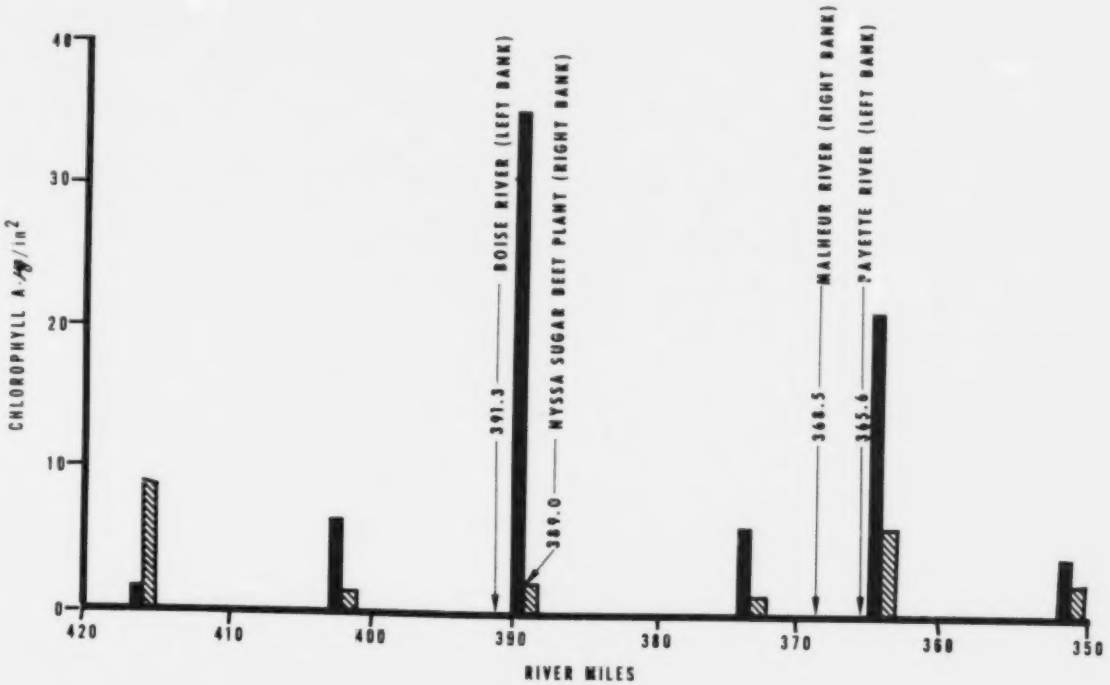


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Figure 8. Algae (Chlorophyll a) and Biomass (Volatile Solids) Snake River. November, 1971

The Amalgamated Sugar Company (RM 388.0) discharged wastewater (6.2 mgd) containing a biochemical oxygen demand of 13,800 pounds. Effluent from the Nyssa WTP enters the river immediately downstream from this sugar-beet processing mill. Downstream, at RM 387.0, the poor quality of Snake River water was sustained. Trout exposed for palatability tests were significantly off-flavor. Densities of total-coliform bacteria, still in violation of the Idaho and Oregon standards, had decreased to 2,800/100 ml.

Near Ontario, Oregon (RM 373.0), the water quality of the Snake River had improved. Nutrient values were similar to those found in the river upstream of the Boise River inflow (average total P, 0.07 mg/l and average NO_2-NO_3, 0.78 mg/l). Sparse growths of filamentous green algae and diatoms on artificial substrates were similar to the growths collected from unpolluted river reaches* [Table C-2].

At Ontario, ORE-IDA Foods, Inc. (RM 370.0) discharged industrial wastes (1.72 mgd) containing an average biochemical oxygen demand of 4,930 pounds and bacterial densities of 6,100,000/100 ml for total-coliforms and 320,000/100 ml, fecal-coliforms. This discharge contributed to violations of Idaho and Oregon stream criteria in that densities of total- and fecal-coliform bacteria in the interstate water of the Snake River, at RM 369.0, increased to 19,000 and 440/100 ml, respectively.

* Filaments of slime bacteria, *Sphaerotilus*, were observed floating downstream (RM 370.0); thus, to find filaments on artificial substrates in clean water was not unexpected.

The chlorinated effluent from the Ontario, Oregon, municipal treatment lagoon was discharged to the Malheur River approximately one mile upstream of its confluence with the Snake River. At the mouth of the Malheur River (RM 368.5/0.1) the bottom was composed of sand and silt. The benthos was sparse and dominated by pollution-tolerant sludgeworms. The stream was judged to be polluted with organic matter.

Inflows from the Malheur River carried sufficient nutrients to stimulate aquatic growths at RM 364.0. *Sphaerotilus* growths tripled in this river reach [Table G-2]; nevertheless, the principal growths were algae [Figure 8]. Growths indicated that this reach was, in organic enrichment, second only to the area immediately downstream from the polluted Boise River. The total- and fecal-coliform bacterial densities were 9,600 and 380/100 ml, respectively.

The water quality upstream of the Weiser River, at RM 353.9, was similar to that found in the unpolluted upper reach of the study area, except for the total-coliform bacterial density of 9,700/100 ml (fecal coliform density averaged 220/100 ml).

The Weiser River at its mouth (RM 351.8/0.1) was relatively unpolluted. The river bottom consisted of rocks and occasional silt deposits. The benthic community, consisting of nine kinds, included pollution-sensitive caddisflies and mayflies.

At RM 350.3 downstream from the mouth of the Weiser River and the Weiser municipal waste discharge, the water quality of the river was acceptable. Inorganic nitrogen concentrations increased to 1.03 mg/l, but phosphorus levels remained the same (0.07 mg/l), as at RM 353.9.

Aquatic growths were minimal: a variety of diatoms and green algae was present. Nevertheless, *Salmonella Saintpaul* was isolated from this station.

In summary, violations of the Oregon and Idaho bacterial standards, applicable to the interstate waters of the Snake River, occurred at all stations sampled. Primary sources of bacterial contamination were the inflow of the Boise River and the municipal and industrial waste discharges on the Oregon side of the Snake River. *Salmonella* was isolated from the waters of this reach, thus indicating fecal contamination. Blue-green algae and slime growths were present as a result of increased nutrient concentrations, thereby violating the general water quality standards for interstate waters.

V. WASTE-SOURCE EVALUATIONS

A. INTRODUCTION

Twelve waste sources (six industrial and six municipal) were evaluated, during the period October 13 to November 8, 1971, in order to determine characteristics of the discharges and their effects on the receiving stream. The industries included the Amalgamated Sugar Company at Nyssa, Oregon (sugar beets); Armour Meat Packing Company at Nampa, Idaho (slaughterhouse); Boise Cascade Company at Emmett, Idaho (plywood); ORE-IDA Food Incorporated at Ontario, Oregon (potatoes, onions, corn); J. R. Simplot Company at Caldwell, Idaho (potatoes); and Triangle Dairy at Boise, Idaho (milk products). The municipalities included Ontario, Oregon, and the Idaho communities of Boise, Caldwell, Garden City, Meridian, and Nampa. These industries collectively discharge to the Snake River or to its tributaries wastewaters (15 mgd) with a biochemical oxygen demand load of 50,000 pounds. Sixty-two percent of this total load (BOD) was discharged by the J. R. Simplot Company. Amalgamated Sugar and Boise Cascade discharged wastes without treatment. The four remaining industries discharged waste loads that were not consistent with "best treatment."

The six municipal waste treatment plants discharged a total of 34 mgd, with a biochemical oxygen demand load of 22,750 pounds. Forty-four percent of this flow, with a BOD load of 17,400 lb/day, was discharged by the Nampa WTP. The five municipal plants in Idaho did not meet the Idaho requirements for secondary treatment (i.e., 85 percent BOD removal): adequate disinfection was not provided by the plants at Caldwell and Nampa. The Ontario, Oregon, WTP provided more than 85 percent BOD removal and had

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adequate disinfection. A brief discussion of the waste sources discharging into selected reaches of the Snake River and its tributaries follows.

This section summarizes information and data on industrial and municipal waste sources that are contained in individual reports on file at the EPA National Field Investigations Center-Denver. [Descriptions of waste treatment facilities and waste discharge data are contained in Appendix J.]

B. IMPACT OF THE FWPCA AMENDMENTS OF 1972

Pursuant to enactment of the Federal Water Pollution Control Act Amendments of 1972, proposed effluent limits for major industrial categories have been developed by EPA. Final effluent limits -- to be issued in the future, are not expected to differ greatly from the proposed limits. [Those limits applicable to industrial discharges evaluate during this survey are found in Appendix K.]

The 1972 Amendments also require at least secondary treatment and disinfection of wastewaters discharged by publicly owned treatment facilities. Regulations that define secondary treatment and which limit concentrations of BOD and suspended solids, and fecal-coliform bacterial densities are to be issued by EPA.*

The 1972 Amendments further require pretreatment of industrial wastewaters that are discharged to publicly owned collection and treatment systems. Regulations, to be issued shortly, are expected to require

* The BOD and suspended solids are expected to be limited to a monthly average of 30 mg/l and a weekly average of 45 mg/l or 85 percent overall reduction, whichever produces the best quality effluent. The fecal-coliform bacterial density are expected to be limited to a weekly average of 400/100 ml and a monthly average of 200/100 ml.

pretreatment of wastewaters to levels comparable to domestic sewage and removal of substances that could inhibit treatment processes or pass through such systems in concentrations detrimental to the quality of the receiving waters.

Waste sources were evaluated to determine compliance with the Idaho and Oregon state requirements, State-Federal water quality standards, and the requirements of the 1972 Amendments. In several cases, treatment to meet the criteria promulgated pursuant to the 1972 Amendments, will not be adequate to protect receiving water quality for designated uses. Those cases are subject to further study; no attempt is made, in this report, to define the levels of treatment required in those cases.

C. WASTEWATER DISCHARGES TO INDIAN CREEK

The Armour Meat Packing Company (RM 11.4) discharged combined boiler blowdown, condensate, and ammonia condenser water (estimated at 0.5 mgd) containing 12 lb/day of BOD. Process wastewater and plant sanitary wastes (effluent from a septic tank) were treated in a one-acre facultative lagoon followed by a large aerobic lagoon (4.2 acres). The aerobic lagoon discharges contained a biochemical oxygen demand load of about 80 lb/day (0.19 lb BOD/1,000 lb LWK). The total load discharged, 92 pounds BOD per day (treated and untreated wastes), was equivalent to 0.22 lb BOD/1,000 lb LWK. Densities of total- and fecal-coliform bacteria were 13,000 and 3,900/100 ml, respectively. The nutrient load was 59 pounds inorganic nitrogen and 17 pounds of total phosphorus per day. Bacterial densities discharged contributed to violations of a) the Idaho Water Quality Standards that are applicable to Indian Creek

and the Boise River and b) the Idaho and Oregon Water Quality Standards that are applicable to the interstate waters of the Snake River. Moreover, the present treatment does not meet the criteria contained in the proposed effluent guidelines applicable to the meat packing industry [Appendix K].

Treatment of the Armour Meat Packing Company wastewaters to meet these guidelines may not be adequate to preclude violations of DO standards during low-flow periods in Indian Creek. Studies in progress should indicate the need for additional treatment, or total containment and re-use of the wastewaters.

The principal waste source discharging to Indian Creek was the Nampa WTP (RM 7.4). In addition to receiving domestic wastes, this plant accepts wastes from several industries, including:

Industry	Avg Flow (mgd)	BOD load lb/day
Amalgamated Sugar Co.	8.5	28,000
Western Farmers, Inc.	0.8	13,000
World Wide Foods	0.8	5,000
Birds Eye	1.4	2,500
Idaho Animal Products	0.3	2,500
Simplot Poultry*	0.4	1,200

Although wastewaters from Amalgamated Sugar Company and Western Farmers, Incorporated, are pretreated prior to entry into the Nampa municipal system, the industrial waste loads caused the treatment plant to be organically overloaded. During the EPA survey the plant removed only 72 percent of the imposed BOD. Disinfection of the effluent was inadequate; the total- and fecal-coliform bacterial densities were 1,200,000

* Not to be confused with the J. R. Simplot Company (potato processing plant) Caldwell, Idaho.

and 96,000/100 ml, respectively. The Nampa wastewater effluent (about 14.8 mgd) contained an average daily load of 17,400 pounds BOD (141 mg/l), 2,200 pounds of inorganic nitrogen, and 390 pounds of total phosphorus [Table J-1].

The discharge of inadequately treated municipal and industrial wastewater degraded Indian Creek, as set forth in Section IV (A) of this report. Any provision for removal of less than 85 percent BOD violates the Idaho Water Quality Standards that are applicable to all waters of the State. The inadequately disinfected effluent violated the general standards and contributed to violations of a) bacterial criteria for the Boise River and b) the Idaho and Oregon Standards that are applicable to the interstate waters of the Snake River.

In order to protect the water quality of Indian Creek and to comply with applicable standards the City of Nampa must provide a very high degree of treatment. Studies now in progress are expected to show that attainment of the necessary treatment level will require an alternative comparable to complete containment and re-use of wastewaters, change in the point of effluent discharge, or interception and treatment at the Caldwell WTP. This type of treatment measure is necessary to prevent water quality degradation of Indian Creek during periods of low flow. The City must also disinfect adequately to prevent the total-coliform bacteria density from exceeding 1,000/100 ml. Federal regulations are expected to limit fecal-coliform bacteria densities to weekly and monthly average of 400 and 200 per 100 ml, respectively.

City officials should be formally advised that ordinance(s) must be enacted to implement Federal regulations pertaining to pretreatment of industrial wastewaters discharged to the Nampa system. Further, an implementation schedule, acceptable to the Idaho State Board of Health and the EPA, must be developed to attain compliance with the ordinance(s).

D. WASTEWATER DISCHARGES TO THE BOISE RIVER

During the EPA survey the principal sources of wastewaters discharged directly to the Boise River were the Cities of Boise and Caldwell, Idaho, and the J. R. Simplot Company. Other sources of wastes evaluated included the Triangle Dairy (Boise) and the Garden City and Meridian municipal waste treatment facilities, none of which provided adequate treatment.

The Boise WTP (RM 49.1) was discharging wastewater (approx. 11.3 mgd) containing 2,600 pounds BOD (27 mg/l), 1,200 pounds inorganic nitrogen, and 600 pounds of total phosphorus. The BOD removal efficiency averaged 85 percent. Total-coliform bacteria densities were high (36,000/100 ml), but those of the fecal-coliform bacteria were low (63/100 ml). City officials should be advised that disinfection must be improved to maintain average total-coliform bacteria densities, in the effluent, of not more than 1,000/100 ml. Monthly and weekly fecal-coliform bacteria densities should not exceed 200 and 400 per 100 ml, respectively.

In addition to domestic wastes, the Caldwell WTP (RM 21.3) received wastes from two major industries, Dairyman's Cooperative Creamery and the Idaho Meat Packing Company. This municipal treatment plant discharged wastewater (4.4 mgd) containing about 2,100 pounds of BOD (57 mg/l),

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300 pounds of inorganic nitrogen, and 135 pounds of total phosphorus. The BOD removal efficiency was approximately 68 percent. Disinfection of the effluent was inadequate: densities of total-coliform bacteria averaged 18,000/100 ml and those of the fecal-coliform bacteria averaged 1,000/100 ml.

In order to comply with applicable water quality standards the City of Caldwell must provide a very high degree of treatment. The effluent discharged from the Caldwell WTP should contain no more than 1,000 lb/day of BOD.* To attain this level of treatment could require containment and re-use of wastewaters. To protect the quality of the Boise River and to comply with applicable standards disinfection must be such that the density of the total-coliform bacteria does not exceed 1,000/100 ml. Applicable Federal regulations are expected to limit fecal-coliform bacteria densities to weekly and monthly averages of 400 and 200 per 100 ml, respectively. Industrial wastewaters accepted for treatment by the municipal plant should receive pretreatment to levels comparable to domestic sewage in order to prevent plant malfunction attributable to shock and seasonal loadings. City officials should be formally advised that ordinance(s) must be enacted to implement Federal regulations pertaining to pretreatment of industrial wastewaters accepted for treatment in the Caldwell system. Further, an implementation schedule acceptable to the Idaho State Board of Health and the EPA must be developed to attain compliance with the ordinance(s).

The J. R. Simplot potato-processing plant (RM 17.6) treats industrial

* This limit is currently recommended by the Idaho State Board of Health.

and domestic wastes in a series of five lagoons. The effluent from the lagoons was discharged on a batch basis (3-hr discharge, twice daily). The effluent BOD was 30,800 lb/day (13.7 lb/ton of potatoes processed); the inorganic nitrogen, 645 lb/day; and the total phosphorus, 350 lb/day. These loads caused violation of the DO standard for the Boise River. The effluent was not disinfected; total- and fecal-coliform bacteria numbered 1,500,000 and 64,000/ml respectively, and contributed to a) violations of the bacterial standards that are applicable to the waters of the Boise River and b) the Idaho and Oregon Water Quality Standards applicable to the interstate waters of the Snake River. Attainment of the proposed effluent guidelines cannot be expected to protect water quality, in the receiving stream, for the designated uses. Although further evaluation of acceptable waste loading, during low-flow conditions, is under way, it is clear that provision must be made for additional treatment or containment/re-use of all wastewaters (e.g. plant discharges, intermittant discharges to the drainage ditch paralleling Idaho Highway 19, etc.).

The Garden City WTP discharged inadequately treated effluent to the Boise River at RM 48/0.8. The effluent contained a BOD load of 138 lb/day (37 mg/l). Biochemical oxygen demand removal averaged about 33 percent. This treatment efficiency constitutes a violation of the Idaho Water Quality Standards that require "highest and best practicable treatment and control." Disinfection of the effluent was inadequate as indicated by average total- and fecal-coliform bacterial densities of 10,000 and 486/100 ml, respectively. City officials should be advised

that in order to comply with applicable State and Federal regulations, disinfection must be improved to limit total coliform densities to 1,000 per 100 ml, and fecal coliform densities to weekly and monthly averages of 400 and 200 per 100 ml, respectively. Studies now under way may indicate the need for additional treatment.

At the time of the survey the City of Meridian provided secondary treatment of domestic sewage and discharged to the Boise River at RM 30.5/16. The effluent contained a BOD load of 135 lb/day (61 mg/l); this value amounted to a 63 percent removal. This treatment efficiency constitutes a violation of the Idaho Water Quality Standards that require "highest and best practicable treatment and control." Disinfection of the effluent was adequate. City officials should be advised that a) present treatment is inadequate and b) treatment beyond that required by Federal regulations could be necessary in order to prevent stream standards violations during low-flow periods.

Triangle Dairy discharged effluent from a two-cell lagoon to the Boise River at RM 57.7/1.5. The BOD load contained in the discharge was insignificant, but, no disinfection was provided. Densities of total- and fecal-coliform bacteria in the effluent were 3,300,000 and 7,700/100 ml, respectively. The effluent must be disinfected or totally contained in order to comply with applicable water quality standards.

E. WASTEWATER DISCHARGES TO THE PAYETTE RIVER

The Boise Cascade Corporation (RM 32.3) discharged 0.029 mgd of untreated wastes to the Payette River with an average BOD of 497 mg/l (120 lb/day). This discharge violates the Idaho Water Quality Standards.

The relatively small quantity of effluent suggests that total containment and/or re-use of this wastewater is necessary to eliminate this violation of the Standards.

The City of Payette, Idaho, provides only primary treatment of domestic wastes, thereby violating the Idaho Water Quality Standards requirements for "highest and best practicable treatment and control." City officials should be advised of the 1972 Amendments and of the regulations pertaining to secondary treatment that are to be published.

F. WASTEWATER DISCHARGES TO THE SNAKE RIVER

The major waste sources discharging directly to the Snake River included the Amalgamated Sugar Company at Nyssa, Oregon (RM 389.0) and ORE-IDA Foods, Inc. at Ontario, Oregon (RM 370.0). The Amalgamated Sugar Company discharged untreated wastes (floor drainage, spills, storm runoff, and condenser cooling water) into the river through three outfalls. The untreated wastes averaged 6.2 mgd and contained 13,800 pounds BOD (2.1 lb/ton of sugar beets processed) as well as 330 pounds of inorganic nitrogen and 10 pounds of total phosphorus. Densities of bacteria in the effluents were high; the major effluent had total- and fecal-coliform bacterial densities of 290,000 and 12,000/100 ml, respectively. The plant had a closed flume water circuit. Lime wastes were discharged to three evaporative settling ponds. The Oregon Department of Environmental Control issued a permit to the Amalgamated Sugar Company that required the treated waste discharged not to exceed, after September 30, 1972, 50 mg/l BOD (5,000 lb/day). At the present production rate this is equivalent to 0.76 lb/ton of sugar beets processed. The proposed effluent guidelines

for the sugar beet industry [Appendix K] limit BOD in the discharge to no more than 0.5 lb/ton of sugar beets processed. The presently discharged waste loads constitute a violation of the Oregon Water Quality Standards that require secondary treatment or the industrial equivalent. The industrial equivalent is defined as 85 percent removal of BOD and TSS.

Company officials should be formally advised that permit conditions will limit BOD and suspended solids discharged and require disinfection. Further, containment and/or re-use could be required during periods of low-flow in the receiving waters.

ORE-IDA Foods, Incorporated, discharged an average of 4,980 lb BOD/day (6.2 lb/ton of vegetables) with densities of total- and fecal-coliforms of 3,100,000 and 220,000/100 ml, respectively. The effluent contained approximately 350 pounds of inorganic nitrogen and 175 pounds of total phosphorus. The Oregon Department of Environmental Control approved a discharge permit limiting the maximum BOD discharged to 3,000 lb/day (3.8 lb/ton of vegetables) by the end of 1975. The waste loads discharged greatly exceed those permitted by the proposed effluent guidelines [Appendix K] and constitute a violation of the Oregon Water Quality Standards that requires secondary treatment or the industrial equivalent. The industrial equivalent is defined as 85 percent removal of BOD and TSS. The discharge of high, coliform bacterial densities is a major contribution to the violations of Idaho and Oregon Standards that are applicable to the interstate waters of the Snake River. Company officials should be advised that the permit conditions for ORE-IDA Foods, Incorporated, will be those provided by Schedule A, for the Canning, Preserved and Frozen Fruits and

Vegetables Processing Industry [Appendix K], and that disinfection of the effluent will be required.

The municipal treatment plant at Ontario discharged 2.1 mgd of wastewater into the Malheur River (RM 368.5/1.0) with an average BOD load of 140 pounds (8 mg/l), equivalent to 93 percent removal. The average inorganic nitrogen and total phosphorus discharged were 40 and 70 pounds, respectively. Disinfection was adequate.

The City of Weiser, Idaho, provides only primary treatment of domestic wastes, thereby violating the Idaho Water Quality Standards requirements for "highest and best practicable treatment and control." City officials should be advised of the 1972 Amendments and of the regulations pertaining to secondary treatment which are to be published.

REFERENCES

1. *Water Quality Control and Management, Snake River Basin,* U.S. Department of the Interior, Federal Water Pollution Control Administration, Northwest Region. Portland, Oregon. September 1968.

2. *Water Resources Review for October 1971,* U.S. Department of the Interior, U.S. Geological Survey.

APPENDIX A

EXTRACTS FROM IDAHO WATER QUALITY STANDARDS

WHICH APPLY TO THE

INTERSTATE AND INTRASTATE WATERS OF THE STATE OF IDAHO

PART 1

GENERAL WATER QUALITY STANDARDS FOR INTERSTATE STREAMS

The following General Water Quality Standards shall apply to all interstate waters of the state in addition to the water quality standards set forth herein for the various specified and unspecified interstate waters of the state. Interstate waters shall not contain:

A. Toxic chemicals of other than natural origin in concentrations found to be of public health significance or adversely affect the use indicated.* (See Appendix 2)

B. Deleterious substances of other than natural origin in concentrations that cause tainting of edible species or tastes and odors to be imparted to drinking water supplies.

C. Radioactive materials of other than natural origin shall not be present in any amount which reflects failure in any case to apply all controls which are physically and economically feasible. In no case shall such materials exceed the limits established in the 1962 U. S. Public Health Service Drinking Water Standards.

D. Floating or submerged matter not attributable to natural causes.

E. Excess nutrients of other than natural origin that cause visible slime growths or other nuisance aquatic growths.

F. Visible concentrations of oil, sludge deposits, scum, foam or other wastes that may adversely affect the use indicated.

G. Objectionable turbidity which can be traced to a point source.

* Guides such as the Water Quality Criteria published by the State of California Water Quality Control Board (Second Edition, 1963) will be used in evaluating the tolerance of the various toxic chemicals for the use indicated.

WATER QUALITY STANDARDS FOR PUBLIC WATERS OF THE MAIN STEM OF THE SNAKE RIVER FROM THE WYOMING-IDAHO BORDER (RIVER MILE 918) TO THE OREGON-IDAHO BORDER (RIVER MILE 407); NORTH FORK TETON RIVER; HENRY'S FORK FROM JUNCTION WITH FALLS RIVER TO THE SNAKE RIVER; RAFT RIVER; GOOSE CREEK; SALMON FALLS CREEK; JARBRIDGE RIVER AND THE BRUMEAU RIVER.

1. No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in these waters:

A. Organisms of the Coliform Group where Associated with Fecal Sources (MPN, equivalent MF or appropriate test using a representative number of samples)

Average concentrations of coliform bacteria to exceed 1,000 per 100 milliliters, with 20 per cent of samples not to exceed 2,400 per 100 milliliters.

B. Dissolved Oxygen (DO)

DO to be less than 75 per cent of saturation at seasonal low or less than 100 per cent saturation in spawning areas during spawning, hatching and fry stages of salmonid fishes.

Exception: Five parts per million at Milner Dam based on a minimum stream flow of 600 cubic feet per second at this point.

C. Hydrogen Ion Concentration (pH)

pH values to be outside the range of 7.0 to 9.0. Induced variation not to be more than 0.5 pH unit.

D. Temperature

Any measurable increase when stream temperatures are 68°F. or above, or more than 2°F. increase when stream temperatures are 66°F. or less.

WATER QUALITY STANDARDS FOR PUBLIC WATERS OF THE MAIN STEM OF THE SNAKE RIVER FROM THE OREGON-IDAHO BORDER (RIVER MILE 407) TO THE HELLS CANYON DAM (RIVER MILE 247).

No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in these waters:

A. Organisms of the Coliform Group where Associated with Fecal Sources (MPN, equivalent MF or appropriate test using a representative number of samples).

Average concentrations of coliform bacteria to exceed 1,000 per 100 milliliters, with 20 per cent of samples not to exceed 2,400 per 100 milliliters.

B. Dissolved Oxygen (DO)

DO to be less than 75 per cent of saturation at seasonal low or less than 100 per cent saturation in spawning areas during spawning.

C. Hydrogen Ion Concentration (pH)

pH values to be outside the range of 7.0 to 9.0. Induced variation not to be more than 0.5 pH unit.

D. Temperature

Any measurable increase when stream temperatures are 70°F. or above, or more than 2°F. increase when river temperatures are 68°F. or less.

PART 2

RULES AND REGULATIONS
FOR THE ESTABLISHMENT OF STANDARDS OF WATER QUALITY AND FOR
WASTE WATER TREATMENT REQUIREMENTS FOR WATERS OF THE STATE OF IDAHO

LEGAL AUTHORITY

The Idaho State Board of Health, pursuant to the authority granted in Title 29, Chapter 1, Idaho Code, sections 39-106 and 39-112, did adopt the following Rules and Regulations for the Establishment of Standards of Water Quality and for Waste Water Treatment Requirements for Waters of the State of Idaho while in regular quarterly session on August 15, 1968, at Coeur d'Alene, Idaho, and did determine the effective date to be September 4, 1968.

PREAMBLE

It shall be the policy of the State Board of Health to provide for an orderly and economically feasible comprehensive water pollution control program, which program shall be administered to conserve the waters of the State for all legitimate beneficial uses, including uses for domestic purposes, agriculture, industry, recreation, and fish and wildlife propagation.

The Board recognizes that the control of water pollution involves many factors, including multiple water uses, economic considerations and overall benefits to the citizens of the State. It shall be the policy of the Board to carry out such a program on a cooperative voluntary and educational basis insofar as such a policy is compatible with statutory duties of the Board.

The Department of Health shall, on the basis of necessary technical studies, determine waste treatment needs throughout the State and shall establish recommended time tables for the provision of such treatment facilities as will be necessary to abate pollution of the waters of the State.

These regulations are intended to be in harmony with existing interstate stream regulations and as an administrative guide for the continuation and supplementation of the program previously carried out by the Board. The regulations are general in nature and are intended for use until such time as the staff of the Department of Health may be able to gather sufficient data to determine more precise quality standards for such individual streams as uses may indicate and until such time as the staff of the Department develops the capability of initiating a permit system as provided in the Idaho statutes.

For these reasons, paragraph 3A should be considered as the basic working arrangement of the water pollution control program which provides,

in effect, special consideration for each and every waste source on the basis of special problems peculiar to that source.

DEFINITIONS

The following definitions shall apply to the interpretation and the enforcement of these regulations:

"Sewage" means the water-carried human or animal waste from residences, buildings, industrial establishments or other places together with such ground water infiltration and surface water as may be present. The admixture with sewage as above defined of industrial wastes or wastes, as defined in the following paragraphs 2 and 3, shall also be considered "sewage."

"Industrial waste" means any liquid, gaseous, radioactive or solid waste substance or a combination thereof resulting from any process of industrial, manufacturing, trade or business, or from the development or recovery of any natural resources.

"Wastes" means sewage, industrial wastes, and all other liquid, gaseous, solid, radioactive or other substances which will or may cause pollution or tend to cause pollution of the public waters of the State.

"Pollution" means such contamination or other alteration of the physical, chemical or biological properties of the public waters of the State, including change in temperature, taste, color, turbidity or odor of the waters, or such discharge of any liquid, gaseous, solid, radioactive or other substance into the waters of the State which either by itself or in connection with any other substance present, will or can reasonably be expected to create a public nuisance or render such waters harmful, detrimental or injurious to public health, safety, or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate uses or to livestock, wildlife, fish or other aquatic life or the habitat thereof.

"Standard" or "standards" means such measure of quality or purity in relation to their reasonable and necessary use as may be established by the State Board of Health.

1. WATER RIGHTS

It shall be the policy of the State Board of Health that the adoption of water quality standards and regulations and the enforcement of such standards and regulations is not intended to conflict with the apportionment of water to the State of Idaho, to any of the interstate compacts or court decrees, or to interfere with the rights of Idaho appropriators in the utilization of water rights.

2. HIGHEST AND BEST PRACTICABLE TREATMENT AND CONTROL REQUIRED

Notwithstanding the water quality standards contained herein, where a higher standard can be achieved, the highest and best practicable treatment and/or control of wastes, activities and flows shall be provided so as to maintain dissolved oxygen at the highest desirable levels and overall water quality as good as practicable, and water temperatures, coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, turbidities, color, odor and other deleterious factors at the lowest desirable levels.

3. RESTRICTIONS ON THE DISCHARGE OF SEWAGE AND INDUSTRIAL WASTE AND HUMAN ACTIVITIES WHICH AFFECT WATER QUALITY IN THE WATERS OF THE STATE

A. No wastes shall be discharged and no activities shall be conducted in such a way that said wastes or activities either alone or in combination with other wastes or activities will violate or can reasonably be expected to violate the water quality standards and/or regulations contained herein.

B. It is noted that from time to time certain short-term activities which are deemed necessary to accommodate essential activities and protect the public interest may be specially authorized by the Department of Health under such conditions as the Department of Health may prescribe even though such activities may result in a reduction of water quality conditions below those criteria and classifications established by this regulation.

4. MAINTENANCE OF STANDARDS OF QUALITY

A. The degree of sewage or waste treatment required to restore and/or maintain the standards of quality and/or maintain existing quality shall be determined in each instance by the State Board of Health and shall be based upon the following:

(1) The uses which are or may likely be made of the receiving stream.

(2) The size and nature of flow of the receiving stream.

(3) The quantity and quality of the sewage or wastes to be treated.

(4) The presence or absence of other sources of pollution on the same watershed.

B. For purposes of enforcement of these standards and regulations, sampling will be done at a point where these standards and/or regulations can be evaluated, except for areas immediately

adjacant to outfalls. Cognizance will be given to the opportunity for admixture of waste effluents with receiving waters, where such admixing is planned and carried out in a manner that will provide minimum degradation to receiving waters.

5. GENERAL WATER QUALITY STANDARDS FOR WATERS OF THE STATE

The following general water quality standards will apply to waters of the State, both surface and underground, in addition to the water quality standards set forth on specifically identified waters. Waters of the State shall not contain:

A. Toxic chemicals of other than natural origin in concentrations found to be of public health significance or to adversely affect the use indicated. (Guides such as the Water Quality Criteria, published by the State of California Water Quality Control Board (Second Edition, 1963) will be used in evaluating the tolerances of the various toxic chemicals for the use indicated.)

B. Deleterious substances of other than natural origin in concentrations that cause tainting of edible species or tastes and odors to be imparted to drinking water supplies.

C. Radioactive materials or radioactivity in water which exceed (1) 1/30th of the MPC values given in Column 2, Table I, Appendix A, Part C, Rules and Regulations for the Control of Radiation in the State of Idaho, (2) exceeds concentration limits of the Idaho Drinking Water Standards for waters used for, or likely to be used for, domestic supplies, (3) results in accumulations of radioactivity in edible plants and animals that present a hazard to consumers, and/or (4) is harmful to aquatic life.

D. Floating or submerged matter not attributable to natural causes.

E. Excess nutrients of other than natural origin that cause visible slime growths or other nuisance aquatic growths.

F. Visible concentrations of oil, sludge deposits, scum, foam or other wastes that may adversely affect the use indicated.

G. Objectionable turbidity which can be traced to a point source or sources.

ON THE BASIS OF THE PRECEDING GENERAL WATER QUALITY STANDARDS, THE FOLLOWING NUMERICAL STANDARDS, WHERE APPLICABLE, SHALL BE APPLIED, EXCEPT WHERE DIFFERENCES OCCUR BETWEEN NUMERICAL STANDARDS CONTAINED HEREIN AND THOSE PREVIOUSLY ADOPTED FOR SPECIFICALLY IDENTIFIED INTERSTATE STREAMS. IN SUCH CASES, STANDARDS FOR INTERSTATE STREAMS SHALL APPLY.

6. NO WASTES SHALL BE DISCHARGED AND NO ACTIVITIES SHALL BE CONDUCTED WHICH EITHER ALONE OR IN COMBINATION WITH OTHER WASTES OR ACTIVITIES WILL CAUSE IN THESE WATERS:

   A. Organisms of the Coliform Group where Associated with Fecal Sources

      (MPN, equivalent MF or appropriate test using a representative number of samples.) Average concentrations of coliform bacteria to exceed 1,000 per 100 milliliters, with 20 percent of samples not to exceed 2,400 per 100 milliliters.

   B. Dissolved Oxygen (DO)

      DO to be less than 75 percent of saturation at seasonal low or less than 100 percent saturation in spawning areas during spawning, hatching, and fry stages of salmonid fishes.

   C. Hydrogen Ion Concentration (pH)

      pH values to be outside the range of 6.5 and 9.0. Induced variation not to be more than 0.5 pH unit.

   D. Temperature

      Any measurable increases when stream temperatures are 68°F. or above, or more than 2°F. increase when stream temperatures are 66°F. or less.

   E. Turbidity

      Turbidity, other than of natural origin, to exceed 10 Jackson Turbidity Units (JTU). (This turbidity requirement shall not be deemed to rigidly apply to streams, drain ditches, etc., receiving irrigation return flow. However, every reasonable effort should be made to prevent excessive turbidity from such wastes.)

IN ADDITION TO THE GENERAL STANDARDS CONTAINED HEREIN, THE FOLLOWING NUMERICAL STANDARDS SHALL APPLY TO THOSE WATERS OF THE STATE WHICH ARE PRESENTLY UPSTREAM FROM EXISTING SIGNIFICANT WASTE SOURCES AND TO ALL LAKES AND RESERVOIRS USED PRIMARILY FOR RECREATION, DRINKING WATER SUPPLIES, FISH AND WILDLIFE PROPOGATION AND/OR AESTHETIC PURPOSES.

7. NO WASTES SHALL BE DISCHARGED AND NO ACTIVITY SHALL BE CONDUCTED WHICH ALONE OR IN COMBINATION WITH OTHER WASTES WILL CAUSE IN THESE WATERS:

   A. Organisms of the Coliform Group

      Average concentration of coliform bacteria to exceed 240 per 100 milliliters with 20 percent of the samples not to exceed 1,000 per

100 milliliters and fecal coliform not to exceed 50 per 100 milliliters with 20 percent of the samples not to exceed 200 per 100 milliliters.

B. Dissolved Oxygen (DO)

DO to be less than 75 percent of saturation at seasonal low or less than 100 percent saturation in spawning areas during spawning, hatching, and fry stages of salmonid fishes.

C. Hydrogen Ion Concentration (pH)

pH values to be outside the range of 6.5 to 9.0. Induced variation not to be more than 0.5 pH unit.

D. Temperature

Any measurable increase when stream temperatures are 66°F. or above, or more than 2°F. increase when stream temperatures are 64°F. or less.

E. Turbidity

Turbidity, other than of natural origin, to exceed 5 Jackson Turbidity Units (JTU).

F. Phosphorus or Nitrogen Compounds

Measurable concentration of phosphorus or nitrogen compounds above those of natural origin.

8. REGULATIONS GOVERNING WASTE DISCHARGES

A. Any person or persons, corporation, officers of any municipality, sewer district or association which owns or operates any facility or carries out any operation which results in the discharge of waste water shall furnish to the Department of Health such information concerning quality and quantity of discharged waste waters and maintain such treatment records as the Department may reasonably require to evaluate the effects on any receiving waters.

B. For the purposes of these regulations, minimum adequate treatment for domestic sewage or industrial wastes containing significant organic material shall be equal to that which is commonly known as secondary treatment or the equivalent of 35 percent removal of the biochemical oxygen demand including adequate disinfection of any wastes which may contain organisms that may produce disease in man or animals. In industrial processes, in-plant process controls or alterations, carried out for the primary purpose of waste reduction, shall be considered as a part of the treatment

process. Exceptions to secondary treatment requirements may be made by the Department of Health when it can be demonstrated that such exceptions will not adversely affect classified water quality and will offer adequate protection for all beneficial uses. Failure to provide adequate treatment shall be considered a violation of these regulations.

C. Any person, persons, corporation or officials of a municipality or sewer district who owns or operates any sewage or other waterborne waste treatment facility shall at all times operate such facility under reasonably competent supervision and with the highest efficiency that can reasonably be expected and shall maintain such facility in good repair.

D. In cases of subsurface sewage or waste disposal, such disposal facilities shall be so located that such sources of pollution including bacteriological, organic or inorganic nutrient pollution will not or will not be likely to enter adjacent waters. In no case shall any portion of such disposal system be located closer than 50 feet horizontally from the edge of any water course, including lakes or reservoirs, as determined from the known highest water level of such water course, lake or reservoir. Improperly or inadequately treated sewage shall not be allowed to accumulate on the ground surface in such a manner that it may create a health hazard.

E. It shall be a violation of these regulations to store, dispose of, or allow to accumulate any deleterious material adjacent to or in the immediate vicinity of any portions of the waters of the State in such a manner that such material will or is likely to enter the stream at times of high water or runoff or where drainage from such materials or accidental failure of storage facilities may transport or allow deleterious material into the water course. Such materials shall include, but not be limited to, trash, rubbish, garbage, oil, gasoline, chemicals, sawdust and accumulations of manure.

F. In case of accidental spills of deleterious materials, persons in responsible charge shall make every reasonable effort to contain spilled material in such a manner that it will not contaminate or pollute any waters of the State, and shall immediately notify the Department of Health of any such spills.

G. Sewage sludge or solid material which may contain disease-producing organisms, when applied to lawns, root crop fields or fields producing foods which may be consumed raw, or otherwise used in such a manner that exposure to persons may be a health hazard, shall be heated to 135°F. or higher for a period of one hour or any equivalent combination of time and temperature approved by the Department of Health before such use.

H. Waste discharges to underground waters shall receive, prior to discharge of such wastes, such treatment as is necessary to render them equal in quality to existing underground waters or such treatment as is necessary to bring such discharge into conformance with the Idaho Drinking Water Standards. The provisions of Paragraph 8H will not be considered as strictly applicable to the existing sink wells used exclusively for irrigation waste water disposal where such disposal does not adversely affect domestic water sources. However, it should be recognized that the long-term preservation of Idaho's vast underground water resources is of great importance and that every reasonable effort should be made to reduce pollution from this source and that a long-term research and development program should be established that will lead to the total elimination of disposal wells that directly affect underground aquifers that are not subject to adequate filtration and percolation to eliminate significant pollution.

Further, this paragraph shall not be construed to preclude the use of deep disposal wells which may be constructed to discharge into underground water strata whose quality is such that it is not likely to be used for other beneficial purposes, provided necessary precautions are taken to prevent contamination of usable aquifers.

I. Sewage Treatment Design Standards and Subsurface Sewage Disposal Standards, as adopted by the Idaho Department of Health, shall be revised from time to time and shall be used as a guide in the review of plans and specifications for waste treatment facilities as required by Section 39-112, Idaho Code.

Regulations relating to Water Pollution Control adopted by the Idaho State Board of Health May 11, 1959, are hereby rescinded.

These Regulations shall be in full force and effect on and after September 4, 1968.

Section 39-112, Par. E -- All plans and specifications for the construction of new sewage systems, sewage treatment or disposal plants or systems, or other waste treatment, or disposal facilities, or for improvement or extensions to existing sewerage systems or sewage treatment or disposal plants, shall be submitted to and be approved by the board, before construction thereof may begin.

APPENDIX B

EXTRACTS FROM OREGON WATER QUALITY STANDARDS

WHICH APPLY TO THE

SNAKE RIVER-WALTERS FERRY TO DOWNSTREAM FROM WEISER, IDAHO

EXTRACTS FROM OREGON WATER QUALITY STANDARDS
WHICH APPLY TO THE
SNAKE RIVER-WALTERS FERRY TO DOWNSTREAM FROM WEISER, IDAHO

"11-011 RESTRICTIONS ON THE DISCHARGE OF SEWAGE AND INDUSTRIAL WASTES AND HUMAN ACTIVITIES WHICH AFFECT WATER QUALITY IN THE WATERS OF THE STATE. No wastes shall be discharged and no activities shall be conducted such that said wastes or activities either alone or in combination with other wastes or activities will violate or can reasonably be expected to violate, any of the general or special water quality standards contained in this subdivision.

"11-015 MAINTENANCE OF STANDARDS OR QUALITY. (1) The degree of waste treatment required to restore and maintain the above standards of quality shall be determined in each instance by the State Sanitary Authority and shall be based upon the following:

(a) The uses which are or may likely be made of the receiving stream.
(b) The size and nature of flow of the receiving stream.
(c) The quantity and quality of the sewage or wastes to be treated, and
(d) The presence or absence of other sources of pollution on the same watershed.

(2) All sewage shall receive a minimum of secondary treatment or equivalent (equal to at least 85% removal of 5-day biochemical oxygen demand and suspended solids) and shall be effectively disinfected before being discharged into any public waters of the state.

"11-016 GENERAL WATER QUALITY STANDARDS. The following General Water Quality Standards shall apply to all waters of the state except where they are clearly superseded by Special Water Quality Standards applicable to specifically designated waters of the state.

No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in any waters of the state:

1) The dissolved oxygen content of surface waters to be less than six (6) milligrams per liter unless specified otherwise by special standard.
2) The hydrogen-ion concentration (pH) of the waters to be outside the range of 6.5 to 8.5 unless specified otherwise by special standard.
3) The liberation of dissolved gases, such as carbon-dioxide, hydrogen sulfide or any other gases, in sufficient quantities

to cause objectionable odors or to be deleterious to fish or other aquatic life, navigation, recreation, or other reasonable uses made of such waters.

4) The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or which and injurious to health, recreation or industry.
5) The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the potability of drinking water or the palatability of fish or shellfish.
6) The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation or industry.
7) Objectionable discoloration, turbidity, scum, oily sleek or floating solids, or coat the aquatic life with oil films.
8) Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing, or shellfish propagation, or be otherwise injurious to public health.
9) Any measurable increase in temperature when the receiving water temperatures are 64°F. or above, or more than 2°F. increase when receiving water temperatures are 62°F or less.
10) Aesthetic conditions offensive to the human senses of sight, taste, smell or touch.
11) Radioisotope concentrations to exceed Maximum Permissible Concentrations (MPC's) in drinking water, edible fishes or shellfishes, wildlife, irrigated crops, livestock and dairy products or pose an external radiation hazard.

"11-033 WATER QUALITY STANDARDS FOR THE MAIN STEM OF THE SNAKE RIVER IN AND ADJACENT TO OREGON. The provisions of this section shall be in addition to and not in lieu of the General Water Quality Standards contained in Section 11-016, except where this section imposes a conflicting requirement with the provisions of Section 11-016, this section shall govern.

No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in the waters of the Snake River:

1) Dissolved Oxygen (DO)

DO concentrations of surface waters to be less than 75% of saturation at seasonal low or less than 95% of saturation in spawning areas during spawning, hatching and fry stages of salmonid fishes.

2) Organisms of the Coliform Group Where Associated with Fecal Sources (MPN or equivalent MF using a representative number of Samples)

Average concentrations of coliform bacteria to exceed 1000 per 100 ml, with 20% of samples not to exceed 2400 per 100 ml.

3) Turbidity (Jackson Turbidity Units, JTU)
Turbidity to exceed 5 JTU above natural background values except for certain short-term activities which may be specifically authorized by the Sanitary Authority under such conditions as it may prescribe and which are necessary to accommodate essential dredging or construction where turbidities in excess of this standard are unavoidable.

4) Temperature
Any measurable increase when river temperatures are 70°F. or above, or more than 2°F. increase when river temperatures are 68°F. or less.

5) Dissolved Chemical Substances
Guide concentrations listed below to be exceeded except as may be specifically authorized by the Sanitary Authority upon such conditions as it may deem necessary to carry out the general intent of Section 11-008 of this subdivision and to protect the beneficial uses set forth in Table A.

	mg/l
Arsenic (As)	0.01
Barium (Ba)	1.0
Boron (Bo)	0.5
Cadmium (Cd)	0.01
Chloride (Cl)	50
Chromium (Cr)	0.05
Copper (Cu)	0.005
Cyanide (CN)	0.01
Fluoride (F)	1.0
Iron (Fe)	0.1
Lead (Pb)	0.05
Manganese (Mn)	0.05
Phenols (totals)	0.001
Total dissolved solids	750
Zinc (Zn)	0.1
Heavy metals (Totals including Cu, Pb, Zn, and others of non-specific designation)	0.5

6) Hydrogen-Ion Concentration (pH)
pH values to fall outside the range of 7.0 to 9.0."

APPENDIX C

STUDY METHODS

STUDY METHODS

A. WASTE SOURCE EVALUATIONS

Six municipal and six industrial waste sources were investigated. Background data on these sources were obtained from the Idaho Environmental Improvement Division files, STORET inventories, and 1899 Refuse Act Permit applications.

Three-day influent and effluent sampling was done at all municipal waste sources, except the Nampa, Idaho, facility, which was sampled for four days. Intermediate points were sampled at the Boise and Nampa plants. Wastewater samples were collected manually at Nampa; automatic sampling equipment (SERCO) was used at the other facilities. Samples were composited on a 24-hour flow-weighted basis. These samples were iced during collection and transportation. Chemical analyses included BOD, COD, TOC, and nutrients. Periodic measurements were made for pH, temperature, conductivity, and chlorine residual (effluent only). Grab samples were collected for bacteriological analyses. When flow-measuring devices were not available at a plant, continuous flow recorders (Stevens Model F) were used.

Samples were collected manually at the J. R. Simplot Company. Automatic sampling equipment was used at the five other industries. Samples were composited on a 24-hour flow-weighted basis at the J. R. Simplot Company and the Amalgamated Sugar Company. An equal volume basis for sample composites was used at the other industries. Flows were measured continuously at all the industries except Boise Cascade and Triangle Dairy

where instantaneous flows were measured. Bacteriological grab samples were collected at all waste-source locations except Boise Cascade. Measurements were made for pH, temperature, and conductivity periodically during the survey. All samples were transported to the EPA mobile laboratory at Nampa. BOD and DO analyses were conducted at Nampa. All other samples were preserved and shipped to the NFIC-Denver laboratory for analyses.

Chemical, Physical, and Bacteriological Parameters

The BOD and DO analyses were conducted according to Standard Methods,[1] using the azide modifications of the Winkler method.

Bacteriological analyses for total and fecal coliforms and for fecal streptococci were performed according to Standard Methods, using the membrane filter technique.

All other chemical analyses and field measurements were conducted in accordance with EPA Methods for Chemical Analysis of Water and Wastes.[2]

Salmonella sampling was accomplished by submerging sterile gauze pads at selected locations for 5- to 7-day periods. The pads were retrieved, placed in plastic bags, chilled, and transported to the EPA mobile laboratory for analysis (within 6 hours after collection). Because there is no standard procedure for detection of *Salmonella* in surface waters, the elevated temperature technique of Spino[3] was used with modifications.

1 *Standard Methods for the Examination of Water and Wastewater*, 13th Edition, American Public Health Association. New York, New York. 1971.
2 *Methods for Chemical Analysis of Water and Wastes*, Environmental Protection Agency, National Environmental Research Center, Analytical Quality Control Laboratory, Cincinnati, Ohio. 1971.
3 Donald F. Spino "Elevated-Temperature Technique for the Isolation of *Salmonella* from Streams," *Applied Microbiology*, Vol 14, No. 4, pp 591-595. July 1966.

Selective enrichment media included dulcito-Selenite enrichment broth and tetrathionate-broth base. Growth from these media containing the pads were subsequently streaked onto selective plating media that consisted of Brilliant Green and XLD agars. Colonies with characteristics typical of *Salmonella* were picked and subjected to biochemical identification, using a commercial multi-test system. Representative *Salmonella* isolated from each location were sent to the National Center for Communicable Disease, Atlanta, Georgia, for serological identification.

B. STREAM SURVEYS

The stream surveys were conducted October 27-November 10, 1971, in two, 7-day phases. The first phase (October 27-November 2) included the Snake River and selected stations of the Owyhee, Boise, Malheur, Payette, and Weiser Rivers. The second phase (November 4-10) included Indian Creek and the Boise and Payette Rivers.

Samples for chemical analyses were collected in clean, unused containers; those for bacteriological analyses were collected in sterile glass containers, iced, and transported to the laboratory, all within 6 hours. Dissolved oxygen samples were collected in 300 ml bottles using an APHA sampler. The samples, except those for BOD analyses, were preserved, iced, and transported to the NFIC-D laboratory for analyses. BOD samples were analyzed at the EPA mobile laboratory stationed in Nampa, Idaho.

The pH, conductivity, and temperature were measured in the field at the time of sampling. Flow data were collected from existing gaging stations where possible.

All chemical, physical, and bacteriological analyses were performed in accordance with the methods outlined in Section A of this appendix.

C. BIOLOGICAL PARAMETERS

Aquatic Growths

Artificial substrates used in this study were designed for collecting both benthic and periphytic organisms from 12 locations in the Snake and Boise Rivers. The part of the substrate designed to accumulate periphyton growths consisted of a series of eight 1 x 3-inch glass slides attached to a nylon line with clothespins [Figure C-1]. After a 14-day exposure in the stream, four slides from each substrate assembly were placed in 10 percent formalin (for microscropic examination) and 90 percent acetone (for chlorophyll analyses), respectively. Those slides placed in acetone were stored on dry ice in the dark.

In the laboratory, aquatic growths from the glass slides were analyzed according to Standard Methods for the following: (1) extracted chlorophyll (2) total and volatile solids, and (3) enumeration of attached organisms. Most organisms were identified to the generic level.

Benthos

Bottom-dwelling invertebrates were sampled using Hester-Dendy artificial substrates [Figure C-1] and standard qualitative and quantitative bottom sampling gear. After 14 days of exposure, substrates were recovered, and the invertebrates found were preserved in 10 percent formalin. Additionally, qualitative or quantitative samples of benthos were collected at each station and similarly preserved. Results from the artificial substrates were expressed as number of animals per substrate; results from

Ekman, Petersen, and Surber samplers were expressed as number of animals per square foot. Organisms collected in qualitative samples, on the Hester-Dendy substrates, were assigned values of one organism per square foot, and included with quantitative data.

Fish Population

The Idaho Fish and Game Department provided a checklist of fish found in the Boise and Snake Rivers. The relative distribution of some of these fish was determined during this study by electroshocking.

Fish Palatability Tests

Six-inch rainbow trout, obtained from the Eagle Fish Hatchery, Idaho Fish and Game Department, were used for palatability studies. The test fish were transferred from the hatchery growth pond to an aerated tank filled with hatchery water for transport to the various test sections.

At the start of the test, healthy fish were killed, gutted, wrapped in foil, and frozen with dry ice for use as a flavor reference sample. The remaining fish were used for palatability tests after stream exposure.

Wire baskets, each containing 10 fish, were placed at the selected river stations. After 72-hour exposures, the fish were retrieved and examined. Survivors were killed, gutted, wrapped in foil, and frozen with dry ice. The frozen fish were shipped to the Department of Food Science and Technology at Oregon State University, Corvallis, for flavor evaluations by a panel of experienced judges.

For testing, the frozen samples were thawed for 2 hours so the fish could be separated and beheaded. Partially frozen samples were enclosed

separately in aluminum foil, placed on a broiler cooking pan, and cooked in a gas oven at 400°F until the flesh flaked from the bones, approximately 60 minutes. The cooked fish were skinned, boned, lightly mixed to insure uniform serving samples, and placed iin the top of double boilers over hot water for serving. Samples were served in coded paper cups (including a duplicate control sample) and were were compared with the reference control sample. The judges scored the intensity of off-flavor from 7 (no off-flavor) to 1 (very extreme off-flavor) and scored the hedonic value from 7 (very desirable) to 1 (very undesirable). When the quantity of sample was sufficient, the test was repeated.

APPENDIX D

LIST OF STREAM STATIONS

TABLE D-1
STREAM SAMPLING LOCATIONS IN THE
SNAKE RIVER AND PRINCIPAL TRIBUTARIES
IDAHO - OREGON

Map Key	Station Description	River Miles	Type of Analysis Performed				
			Chemical	Bacteriological	Biological		
					Aquatic Growths	Fish Palatability	Benthos
1	Snake River at Walters Ferry, Idaho	442.5	x	x			x
2	Snake River at Marsing, Idaho	424.0	x				x
3	Snake River at Homedale, Idaho	416.0	x		x	x	x
4	Snake River at Adrian, Oregon	401.8	x	x	x	x	x
5	Owyhee River at Mouth	392.3/2.9	x	x			x
6	Boise River at Mouth	391.3/0.1	x	x			x
7	Boise River at Parma, Idaho	391.3/5.0	x	x	x	x	x
8	Boise River at Notus, Idaho	391.3/13.8	x	x	x		x
9	Boise River, upstream of Simplot	391.3/17.7	x	x			
10	Indian Creek at Mouth	391.3/19.7/0.1	x	x			x
11	Indian Creek, upstream of Caldwell	391.3/19.7/2.8	x				x
12	Indian Creek at Midway Road	391.3/19.7/5.0	x	x			x
13	Indian Creek, upstream of Nampa Treatment Plant	391.3/19.7/7.5	x	x			
14	Indian Creek, downstream from Armour	391.3/19.7/10.4	x				x
15	Indian Creek, upstream of Armour	391.3/19.7/11.9	x				x
16	Boise River at Caldwell	391.3/21.8	x	x	x	x	x
17	Boise River, south of Middleton	391.3/26.5	x				x

TABLE D-1 (Cont.)
STREAM SAMPLING LOCATIONS IN THE
SNAKE RIVER AND PRINCIPAL TRIBUTARIES
IDAHO - OREGON

Map Key	Station Description	River Miles	Type of Analysis Performed				
			Chemical	Bacteriological	Biological		
					Aquatic Growths	Fish Palatability	Benthos
18	Boise River, south of Star	391.3/33.9	x			x	x
19	Boise River at Strawberry Glen Bridge	391.3/47.1	x	x		x	x
20	Boise River at Capitol Boulevard	391.3/52.8	x				x
21	Boise River at Eckert Road	391.3/58.2	x	x	x	x	x
22	Snake River, downstream from Boise River	390.5	x	x		x	x
23	Snake River, upstream of Nyssa, Oregon	389.0	x	x	x		x
24	Snake River, downstream from Nyssa, Oregon	387.0	x	x		x	x
25	Snake River, upstream of Ontario, Oregon	373.0	x	x	x		x
26	Snake River, upstream of Malheur River	369.0	x	x		x	x
27	Malheur River at Mouth	368.5/1.0	x	x			x
28	Snake River, upstream of Payette River	367.0	x	x		x	x
29	Payette River at Mouth	365.6/0.1	x	x			x
30	Payette River at Payette	365.6/4.1	x	x			x
32	Payette River at New Plymouth	365.6/23.5	x	x			x
33	Payette River at Letha	365.6/28.0	x	x			
34	Payette River, downstream from Emmett, Idaho	365.6/32.0	x	x			
35	Payette River at Emmett	365.6/33.3	x	x			
36	Snake River, downstream from Payette River	364.0	x	x	x	x	x

TABLE D-1 (Cont.)
STREAM SAMPLING LOCATIONS IN THE
SNAKE RIVER AND PRINCIPAL TRIBUTARIES
IDAHO - OREGON

Map Key	Station Description	River Miles	Type of Analysis Performed				
			Chemical	Bacteriological	Biological		
					Aquatic Growths	Fish Palatability	Benthos
37	Snake River, upstream of Weiser, Idaho	353.9	X	X			
38	Weiser River at Mouth	351.8	X	X		X	X
39	Snake River, downstream from Weiser, Idaho	350.3	X	X			X
					X	X	X

APPENDIX E

FIELD MEASUREMENTS AND CHEMICAL DATA
STREAM SURVEY

TABLE E-1

SUMMARY OF FIELD MEASUREMENTS AND CHEMICAL DATA AT SELECTED STATIONS ON INDIAN CREEK
NOVEMBER 4-10, 1971

Map Key	Station Description		Temp. °C	Cond. µmhos/cm	pH S.U.	Dissolved Oxygen mg/l	Dissolved Oxygen % Sat.	Alkalinity mg/l as $CaCO_3$	BOD[b/] mg/l	TOC mg/l
15	**Indian Creek, upstream** of Armour (RM 391.3/19.7/11.9)	AVERAGE				9.8	92	283	**4.3**	5
		RANGE	5.5-11.5	470-750	7.7-8.1	8.8-10.8	80-105	274-294	<2-10.0	3-7
14	**Indian Creek, upstream** of Nampa (RM 391.3/19.7/10.4)	AVERAGE				**9.3**	90	289		5
		RANGE	6.5-10.5	750-800	7.8-8.0	8.3-10.4	84-103	276-306		4-7
13	**Indian Creek, upstream** of the Nampa Wastewater Treatment Plant (RM 391.3/19.7/7.5)	AVERAGE				8.7	87	277	2.8[a/]	5
		RANGE	9.0-13.0	625-750	7.7-8.0	8.2-9.4	89-95	268-287		2-14
12	Indian Creek at Midway Road (RM 391.3/19.7/5.0)	AVERAGE				4.4	47	302	**13.0**	11
		RANGE	13.0-15.5	775-825	7.4-7.7	3.2-5.8	34-61	288-327	7.6-20.0	9-14
11	**Indian Creek, upstream** of Caldwell (RM 391.3/19.7/2.8)	AVERAGE				5.2	54	300	9.2[a/]	9
		RANGE	11.5-15.0	750-800	7.5-8.0	3.6-6.4	40-65	291-321		6-13
10	Indian Creek at Mouth (RM 391.3/19.7/0.1)	AVERAGE				8.1	82	281	**7.5**	5
		RANGE	10.0-14.0	600-775	7.8-8.2	7.4-8.6	76-88	260-303	4.3-11.2	4-5

a/ This is a single value.
b/ All values recorded as "less than" have not been used to calculate average.

TABLE E-2

SUMMARY OF FIELD MEASUREMENTS AND CHEMICAL DATA
AT SELECTED STATIONS ON THE BOISE RIVER
NOVEMBER 4-10, 1971

Map Key	Station Description		Temp °C	Cond. µmhos/cm	pH	Dissolved Oxygen mg/l	Dissolved Oxygen % Sat.	Alkalinity mg/l as $CaCO_3$	BOD mg/l	TOC mg/l	Kj mg/l as N	NH_3 mg/l as N	$NO_2 + NO_3$ mg/l as N	Total P mg/l
21	**Boise River, upstream** of Boise (RM 391.3/58.2)	Range	4.5-7.5	80-85	7.1-7.6	9.9-11.4	86-102	36-50		1-3	0.3[b]		0.10-0.15	0.01-0.06
		Average				10.6	95	42	<2[a]	2		<0.1[a]	0.14	0.04
20	Boise River at Capitol Blvd.[c] (RM 391.3/52.8)	Range	5.0-7.0	70-100	6.9-8.5	9.7-13.6	84-118	41-67		1-3	0.2		0.08-0.13	<0.01-0.13
		Average				11.7	104	47	<2[a]	2		<0.1[a]	0.11	0.05
19	Boise River at Strawberry Glen Bridge (RM 391.3/47.1)	Range	5.0-7.0	150-170	7.1-7.7	9.2-12.4	80-109	60-103	<2-8.1	1-7	<0.1-1.9	<0.1-0.4	0.28-0.38	0.39-0.77
		Average				10.8	96	70	5.7	4	1.1	0.3	0.32	0.6
18	**Boise River, south** of Star (RM 391.3/33.9)	Range	5.5-6.0	190-250	7.3-8.1	9.0-13.0	79-110	91-135	2.1-4.8	2-9	0.3-0.7	0.1-0.3	0.75-1.03	0.34-0.59
		Average				10.9	95	105	3.5	5	0.5	0.2	0.89	0.44
17	**Boise River, south** of Middleton (RM 391.3/26.5)	Range	4.5-5.5	310-340	7.5-8.5	9.5-14.8	83-130	113-192		2-5	<0.1-0.4	0.2[b]	0.63-1.47	0.20-0.44
		Average				11.9	104	137	8.1[d]	4	0.3		1.16	0.33
16	**Boise River, upstream** of Caldwell (RM 391.3/21.8)	Range	5.5-6.5	430-480	7.6-8.2	9.4-12.7	84-114	142-176	<2-8.2		<0.1-0.7	<0.1-0.2	1.43-1.73	0.24-0.37
		Average				11.0	98	166	4.6		0.4	0.1	1.67	0.31
9	**Boise River, upstream** of Simplot (RM 391.3/17.7)	Range	6.0-9.5	480-580	7.9-8.1	9.4-10.3	85-97	208-218	4.1-4.8	3-5	0.1-0.6	<0.1-0.1	1.70-2.20	0.38-0.45
		Average				9.9	91	212	4.4	4	0.4	0.1	1.95	0.42

TABLE E-2 (Cont.)

SUMMARY OF FIELD MEASUREMENTS AND CHEMICAL DATA
AT SELECTED STATIONS ON THE BOISE RIVER
NOVEMBER 4-10, 1971

Map Key	Station Description		Temp °C	Cond. µmhos/cm	pH	Dissolved Oxygen mg/l	Dissolved Oxygen % Sat.	Alkalinity mg/l as $CaCO_3$	BOD mg/l	TOC mg/l	Kj	NH_3 mg/l as N	$NO_2 + NO_3$	Total P mg/l
8	Boise River at Notus[e/] (RM 391.3/13.8)	Range	5.0-9.0	700-850	7.1-8.1	6.4-10.4	60-97	206-231	3.1-13.0	2-6	0.2-1.9	<0.1-0.5	1.60-2.20	0.41-0.76
		Average				8.5	77	216	7.8	4	0.7	0.3	1.88	0.56
7	Boise River at Parma[f/] (RM 391.3/5.0)	Range	5.0-8.0	700-900	8.1-8.2	8.4-11.2	79-105	199-240	2.5-6.6	2-5	0.2-1.7	0.7[b/]	0.63-2.30	0.35-0.40
		Average				9.6	87	222	3.6	3	0.7		1.82	0.36

a/ All values are equal.
b/ All other values were less than detectable.
c/ Stream flow averaged 106 cfs, with a range of 23-120 cfs.
d/ Single value.
e/ Stream flow was measured as 885 cfs on all days of the survey.
f/ Stream flow averaged 1115 cfs, ranging from 1061 to 1218 cfs. This station was also sampled October 27-November 2, 1971.

TABLE E-3

SUMMARY OF FIELD MEASUREMENTS AND CHEMICAL DATA
AT SELECTED STATIONS ON THE PAYETTE RIVER
NOVEMBER 4-10, 1971

Map Key	Station Description		Flow cfs	Temp. °C	Cond. µmhos/cm	pH	Dissolved Oxygen mg/l	Dissolved Oxygen % Sat.	Alkalinity mg/l as $CaCO_3$	BOD mg/l	TOC mg/l	Kj mg/l as N	NH_3 mg/l as N	$NO_2 + NO_3$ mg/l as N	Total P mg/l
35	Payette River Emmett (RM 365.6/33.3)	Range	890-1020	2.0-5.0	130-160	7.4-8.7	10.5-12.8	88-109	34-49	<2-3.8	2-4	<0.1-0.4		0.04-0.10	0.02-0.07
		Average	977				12.2	102	39	3.4	3	0.3	<0.1[a]	0.07	0.05
34	Payette River, downstream from (RM 365.6/32.0)	Range		4.0-5.0	130-170	8.2-8.5	11.8-12.9	100-108	34-47		2-3	0.1[b]		0.04-0.05	0.03-0.04
		Average					12.4	105	40	<2[a]	3		<0.1[a]	0.04	0.03
33	Payette River at Letha Bridge (RM 365.6/28.0)	Range	800-900	2.0-5.0	150-180	7.4-8.8	10.8-13.8	91-118	39-53	<2-4.2	2-5	<0.1-1.0		0.04-0.10	0.03-0.05
		Average	850				12.2	101	46	3.1	3	0.6	<0.1[a]	0.06	0.04
32	Payette River at New Plymouth (RM 365.6/23.5)	Range	800-1400	2.0-7.0	200-260	7.9-8.7	10.8-13.0	93-111	67-79		2-3	1.0[b]		0.09-0.19	0.02-0.09
		Average	1100				11.9	101	73	<2[a]	2		<0.1[a]	0.14	0.06
30	Payette River at Payette (RM 366.6/4.1)	Range	1050-1680	4.0-7.0	250-290	8.0-8.6	11.2-12.8	96-107	73-177	<2-2.8	2-5	0.2[b]		0.14-0.23	<0.01-0.06
		Average	1360				11.9	102	108	2.8	3		<0.1[a]	0.18	0.05

a/ All values are equal.
b/ All other values were less than detectable.
c/ This station was also sampled during the period October 27-November 2, 1971.

TABLE E-4

SUMMARY OF FIELD MEASUREMENTS AND CHEMICAL DATA AT SELECTED STATIONS
SNAKE RIVER BASIN - WALTERS FERRY TO DOWNSTREAM FROM WEISER, IDAHO
OCTOBER 27-NOVEMBER 2, 1971

Map Key	Station Description		Temp. °C	Cond. µmhos/cm	pH S. U.	Dissolved Oxygen mg/l	Dissolved Oxygen % Sat.	Alkalinity mg/l as $CaCO_3$	BOD[f] mg/l	TOC mg/l	mg/l as N K_j[f]	mg/l as N NH_3[f]	mg/l as N $NO_2 + NO_3$	Total P mg/l
1	Snake River at Walters Ferry (RM 442.5)	AVERAGE				11.5	105	179	2.9	3	0.1	<0.1[a]	0.68	0.06
		RANGE	7.0-9.0	400-800	8.2-8.4	10.4-12.9	97-118	171-202	<2-3.8	1-6	<0.1-0.2		0.65-0.70	0.05-0.07
2	Snake River at Marshing ORM 424.0)	AVERAGE				11.5	104	176	2.7	3	0.1	<0.1[a]	0.67	0.07
		RANGE	6.5-9.0	480-725	8.0-8.6	9.9-13.2	93-120	167-184	<2-3.2	2-4	<0.1-0.2		0.65-0.68	0.05-0.12
3	Snake River at Homedale (RM 416.0)	AVERAGE				11.5	104	178	2.8	2	0.2	<0.1[a]	0.67	0.06
		RANGE	6.5-9.0	480-775	8.0-8.6	10.7-13.0	92-117	173-183	<2-3.7	1-4	<0.1-0.2		0.65-0.73	0.04-0.07
4	Snake River at Adrian (RM 401.8)	AVERAGE				11.3	102	182	3.0	3	0.3	<0.1[a]	0.74	0.06
		RANGE	5.0-9.0	500-775	8.1-8.6	10.1-12.4	91-112	176-185	<2-3.8	2-5	<0.1-0.8		0.70-0.83	0.05-0.08
5	Owyhee River near mouth (RM 392.3/2.9)	AVERAGE				13.7	120	314	3.0	5	0.3	<0.1[a]	2.25	0.12
		RANGE	1.5-8.5	1,300-3,000	6.5-8.5	8.9-16.6	79-148	302-340	<2-3.8	3-8	0.3-0.4		2.03-2.48	0.09-0.27
7	Boise River[b] at Parma (RM 391.3/5.0)	AVERAGE				9.8	88	237	3.6	3	0.4	0.1[a]	2.04	0.35
		RANGE	6.0-9.0	310-1,100	7.7-8.1	7.5-11.9	68-110	215-244	2.7-7.2	2-4	0.2-0.9		1.75-2.50	0.25-0.65
6	Boise River near mouth (RM 391.3/0.1)	AVERAGE				10.0	88	235	4.0	3	0.4	0.1	2.04	0.38
		RANGE	3.0-9.0	420-750	7.2-8.5	8.6-11.2	78-99	222-243	<2-7.0	3-4	0.1-0.6	<0.1-0.2	1.68-2.45	0.27-0.68

TABLE E-4 (Cont.)

SUMMARY OF FIELD MEASUREMENTS AND CHEMICAL DATA AT SELECTED STATIONS
SNAKE RIVER BASIN - WALTERS FERRY TO DOWNSTREAM FROM WEISER, IDAHO
OCTOBER 27-NOVEMBER 2, 1971

Map Key	Station Description		Temp. °C	Cond. µmhos/cm	pH S. U.	Dissolved Oxygen mg/l	Dissolved Oxygen % Sat.	Alkalinity mg/l as $CaCO_3$	BOD[f] mg/l	TOC mg/l	mg/l as N K_j[f]	mg/l as N NH_3[f]	mg/l as N $NO_2 + NO_3$	Total P mg/l
22	**Snake River, downstream from the Boise River (RM 390.5)**	AVERAGE				10.8	95	207	2.5	3	0.2	[d]	1.12	0.10
		RANGE	3.0-9.0	390-610	7.4-8.5	9.3-11.8	77-106	181-239	2.2-3.2	1-4	<0.1-0.4	<0.1-0.1	0.90-1.70	0.08-0.14
23	Snake River at Nyssa (RM 389.0)	AVERAGE				11.2	97	177	2.6	2	0.2	<0.1[a]	0.72	0.06
		RANGE	3.0-10.0	230-530	7.2-8.7	10.6-12.0	87-107	160-185	<2-3.1	1-4	<0.1-0.2		0.68-0.74	0.04-0.09
24	**Snake River, downstream from Nyssa (RM 387.0)**	AVERAGE				11.3	100	186	3.0	3	0.2	<0.1[a]	0.76	0.07
		RANGE	4.0-10.0	480-580	7.1-9.0	10.8-11.8	91-105	175-208	<2-4.3	2-4	<0.1-0.3		0.70-0.83	0.06-0.09
25	**Snake River, upstream of Ontario (RM 373.0)**	AVERAGE				11.2	97	189	2.8	3	0.2	<0.1[a]	0.78	0.07
		RANGE	5.0-10.0	450-600	7.2-8.6	10.8-11.8	92-103	175-222	2.3-3.4	1-4	<0.1-0.3		0.73-0.90	0.05-0.10
26	**Snake River, upstream of Malheur River (RM 369.0)**	AVERAGE				11.1	98	184	3.5	2	0.3	[a]	0.79	0.07
		RANGE	4.0-10.0	500-580	7.2-8.6	10.1-11.6	91-104	172-202	<2-5.6	2-3	<0.1-0.4	<0.1-0.5	0.69-0.83	0.05-0.08
27	Malheur River near mouth (RM 368.5/0.1)	AVERAGE				11.4	97	402	2.3	6	0.3	<0.1[a]	2.11	0.32
		RANGE	3.0-7.5	1,250-2,200	8.0-8.4	9.6-13.4	87-112	370-431	<2-2.6	4-8	0.2-0.4	--	1.83-2.40	0.28-0.43
28	**Snake River, upstream of Payette River (RM 367.0)**	AVERAGE				11.0	97	196	3.0	3	0.2	<0.1[a]	1.38	0.07
		RANGE	5.0-8.0	440-600	7.2-8.7	10.6-11.3	93-103	180-227	2.4-3.9	1-4	0.1-0.3	--	0.65-3.95	0.05-0.10

TABLE E-4 (Cont.)

SUMMARY OF FIELD MEASUREMENTS AND CHEMICAL DATA AT SELECTED STATIONS
SNAKE RIVER BASIN - WALTERS FERRY TO DOWNSTREAM FROM WEISER, IDAHO
OCTOBER 27-NOVEMBER 2, 1971

Map Key	Station Description		Temp. °C	Cond. µmhos/cm	pH S. U.	Dissolved Oxygen mg/l	Dissolved Oxygen % Sat.	Alkalinity mg/l as $CaCO_3$	BOD[f] mg/l	TOC mg/l	mg/l as N K_j[f]	mg/l as N NH_3[f]	mg/l as N $NO_2 + NO_3$	Total P mg/l
30	Payette River[b] at Payette (RM 365.6/4.1)	AVERAGE				11.4	98	72	2.4	2.1	<0.1[a]	[c]	0.19	0.05
		RANGE	4.0-7.0	190-280	7.3-8.0	10.8-12.2	94-107	64-78	<2-2.7	1.0-6.0		<0.1-0.1	0.13-0.25	<0.01-0.10
29	Payette River near mouth (RM 365.6/0.1)	AVERAGE				10.0	89	128	2.5	2.6	0.1	<0.1[a]	0.48	0.05
		RANGE	4.5-8.0	320-490	8.5-8.9	7.0-11.0	59-99	73-163	<2-3.3	2.0-4.0	<0.1-0.2		0.30-0.63	0.01-0.08
33	Snake River, downstream from the Payette River (RM 364.0)	AVERAGE				11.0	98	184	3.0	2.8	0.2	[c]	0.89	0.07
		RANGE	6.0-8.0	450-560	7.0-8.8	10.4-11.7	93-104	179-198	2.4-4.9	1.0-4.0	0.1-0.4	<0.1-0.1	0.65-1.55	0.06-0.08
34	Snake River, upstream of Weiser River (RM 353.9)	AVERAGE				10.6	96	180	2.9	3.5	0.2	[b]	0.71	0.06
		RANGE	6.0-8.0	500-540	7.6-8.7	10.2-11.0	94-98	176-186	2.0-3.8	1-6	<0.1-0.3	<0.1-0.1	0.60-0.75	0.05-0.08
35	Weiser River near mouth (RM 351.8/0.1)	AVERAGE				11.8	97	95	[d]	2		<0.1[a]	0.12	0.04
		RANGE	2.0-7.0	200-360	7.5-8.3	10.0-13.2	82-112	78-112	<2-2.1	1-3	<0.1-0.1		0.08-0.19	<0.01-0.08
36	Snake River, downstream from Weiser[e] (RM 350.3)	AVERAGE				10.9	97	177	4.0	3.6	0.2	[c]	1.03	0.07
		RANGE	5.0-10.0	480-575	7.2-8.7	10.1-11.6	93-104	168-183	<2-3.6	1-6	<0.1-0.5	<0.1-0.1	0.60-2.30	0.03-0.14

a/ All values are the same.
b/ This station was also sampled during the period of November 4-10, 1971.
c/ All values except one were less than detectable.
d/ All values except one were <2.
e/ Stream flow at USGS gaging station near Weiser (RM 351.3) averaged 25,200 cfs during the survey.
f/ All values recorded as "less than" have not been used to calculate average.

APPENDIX F

BACTERIOLOGICAL RESULTS

Table F-1
RESULTS OF BACTERIOLOGICAL ANALYSES AT SELECTED STATIONS
INDIAN CREEK STREAM SURVEY
November 4-10, 1971

Map Key	Station Description	Total Coliforms MF Count/100 ml			% Samples	Fecal Coliforms MF Count/100 ml			Fecal Streptococci MF Count/100 ml		
		Maximum	Mean	Minimum	≥ 2,400	Maximum	Mean	Minimum	Maximum	Mean	Minimum
13	**Indian Creek, upstream of Nampa, Idaho** (RM 391.3/19.7/7.5)	47,000	14,000	3,100	100	600	350	120	8,000	2,800	310
12	Indian Creek at Midway Road (RM 391.3/19.7/5.0)	86,000	30,000	3,600	100	2,700	900	270	7,000	2,300	680
10	Indian Creek near Mouth (River Mile 391.3/19.7/0.1)	48,000	18,000	2,500	100	12,000	2,500	390	2,700	1,300	130

TABLE F-2
RESULTS OF BACTERIOLOGICAL ANALYSES AT SELECTED STATIONS
BOISE RIVER STREAM SURVEY
NOVEMBER 4-10, 1971

Map Key	Station Description	Total Coliforms MF Count/100 ml			% Samples	Fecal Coliforms MF Count/100 ml			Fecal Streptococci MF Count/100 ml		
		Maximum	Mean[a]	Minimum	≥ 2,400	Maximum	Mean[a]	Minimum	Maximum	Mean[a]	Minimum
21	**Boise River, upstream of Boise, Idaho** (RM 391.3/58.2)	270	210	130	-0-	<100	10	<4	1,200	380	50
20	Boise River at Strawberry Glen Road (RM 391.3/47.1)	> 80,000	15,000	710	85.5	39,000	6,600	<100	280	160	<10
16	**Boise River, upstream of Caldwell,** Idaho (RM 391.3/21.8)	2,800	2,400	1,900	66.7	800	490	280	1,900	960	500
9	**Boise River, upstream of J. R. Simplot** Company (RM 391.3/17.7)	76,000	27,000	4,500	100	1,300	950	320	1,800	1,100	470
8	Boise River at Notus, Idaho (RM 391.3/13.8)	260,000	66,000	2,300	85.5	9,300	2,400	100	21,000	4,800	450
7	Boise River at Parma, Idaho (RM 391.3/5.0)	44,000	26,000	3,400	100	1,500	480	160	2,200	830	290

[a] Values reported as " < " not included in calculation of mean.

TABLE F-3
RESULTS OF BACTERIOLOGICAL ANALYSES AT SELECTED STATIONS
PAYETTE RIVER STREAM SURVEY
November 4-10, 1971

Map Key	Station Description	Total Coliforms MF Count/100 ml			% Samples	Fecal Coliforms MF Count/100 ml			Fecal Streptococci MF Count/100 ml		
		Maximum	Mean[a]	Minimum	≥ 2,400	Maximum	Mean[a]	Minimum	Maximum	Mean[a]	Minimum
35	**Payette River, upstream of Emmett** (RM 365.6/33.3)	100	58	12	-0-	<100	19	<4	2,300	340	8
34	**Payette River, downstream from Emmett** (RM 365.6/32.0)	4,200	1,500	360	25	180	88	20	100	57	40
33	Payette River at Letha Bridge (RM 365.6/28.0)	680	250	40	-0-	110	48	8	280	100	40
30	Payette River at Payette (RM 365.6/4.1)	640	400	76	-0-	64	39	20	180	120	84

[a] Values reported as " < " not used in calculation of mean.

TABLE F-4
RESULTS OF BACTERIOLOGICAL ANALYSES AT SELECTED STATIONS
SNAKE RIVER BASIN STREAM SURVEY
October 27-November 2
1971

Map Key	Station Description	Total Coliforms MF Count/100 ml			# Samples	Fecal Coliforms MF Count/100 ml			Fecal Streptococci MF Count/100 ml		
		Maximum	Mean[a]	Minimum	≥ 2,400	Maximum	Mean[a]	Minimum	Maximum	Mean[a]	Minimum
1	Snake River at Walters Ferry (RM 442.5)	3,400	1,400	220	33.3	1,000	190	8	15,000	4,800	64
4	Snake River at Adrian (RM 401.8)	6,600	2,200	150	28.5	32	17	<10	<10,000	2,900	210
5	Owyhee River near Mouth (RM 392.3/2.9)	6,300	1,700	110	28.6	140	74	30	9,300	1,900	450
7	Boise River at Parma (RM 391.3/5.0)	130,000	5,300	2,800	100	130,000	23,000	690	110,000	27,000	700
6	Boise River near Mouth (RM 391.3/0.1)	>80,000	37,000	1,900	83.3	130,000	29,000	110	87,000	14,000	190
22	**Snake River, downstream from Mouth of the Boise River (RM 390.5)**	120,000	33,000	100	57.1	74,000	21,000	<4	2,700	800	70
23	**Snake River, upstream of Nyssa (RM 389.0)**	52,000	8,900	90	28.6	460	130	<4	2,000	490	40
24	**Snake River, downstream from Nyssa (RM 387.0)**	7,300	2,800	480	28.6	1,600	440	24	560	310	130
25	**Snake River, upstream of Ontario (RM 373.0)**	5,600	3,800	1,900	66.7	200	160	120	2,600	1,800	1,200
26	**Snake River, upstream of Malheur River (RM 369.0)**	92,000	19,000	1,300	71.4	1,500	440	40	7,700	3,300	480
27	Malheur River near Mouth (RM 368.5/0.1)	5,200	1,000	120	14.3	100	51	8	5,900	1,500	570
28	**Snake River, upstream of the Payette River (RM 367.0)**	4,300	3,900	3,500	100	760	470	180	3,900	3,900	3,900
30	Payette River at Payette (RM 365.6/4.1)	2,900	930	290	14	88	64	16	4,500	1,500	100
29	Payette River at Mouth (RM 365.6/0.1)	3,800	9,600	330	40	1,000	270	40	29,000	5,000	530

TABLE F-4 (Cont.)
RESULTS OF BACTERIOLOGICAL ANALYSES AT SELECTED STATIONS
SNAKE RIVER BASIN STREAM SURVEY
October 27-November 2
1971

Map Key	Station Description	Total Coliforms MF Count/100 ml			% Samples	Fecal Coliforms MF Count/100 ml			Fecal Streptococci MF Count/100 ml		
		Maximum	Mean[a/]	Minimum	> 2,400	Maximum	Mean[a/]	Minimum	Maximum	Mean[a/]	Minimum
36	Snake River at Idaho 52 Bridge (RM 364.0)	24,000	9,600	2,800	100	840	380	50	4,000	3,000	1,900
37	Snake River, upstream of the Weiser River (RM 353.9)	29,000	9,700	1,500	50	530	220	88	2,400	1,400	580
38	Weiser River at Mouth (RM 351.8/1.0)	2,800	1,100	130	28.5	100	46	< 4	17,000	2,700	200
39	Snake River, downstream from the Weiser River (RM 350.3)	27,000	8,500	2,200	80	310	200	56	6,100	3,000	770

a/ Values reported as "<" are not used in calculating the mean.

TABLE F-5

SALMONELLA ISOLATIONS FOR SNAKE AND BOISE RIVERS

October 27-November 10, 1971

Map Key	Station Description	Serotype Isolated
22	Snake River, downstream from the Mouth of Boise River (RM 390.5)	*Salmonella enteritidis* *S. newport* *S. typhimurium*
39	Snake River, downstream from Weiser, Idaho (RM 350.3)	*S. Saintpaul*
M-4	Boise, Idaho Sewage Treatment Effluent	*S. heidelberg* *S. newport*
19	Boise River at Strawberry Glen Bridge, downstream from Boise (RM 391.3/47.1)	*S. infantis* *S. typhimurium*
M-1	Nampa, Idaho Sewage Treatment Plant Effluent	*S. derby*
16	Boise River, upstream of Caldwell, Idaho (RM 391.3/21.8)	*S. dublin*
8	Boise River at Notus, Idaho (RM 391.3/13.8)	*S. dublin*
6	Boise River near Mouth (RM 391.3/0.1)	*S. newport*

APPENDIX G

AQUATIC GROWTHS

TABLE G-1
AQUATIC GROWTHS FROM ARTIFICIAL SUBSTRATES, BOISE RIVER
October 18-November 10, 1971

Location	River Mile	Pennate Diatoms Type	Pennate Diatoms Cells/in.^{2}*	Centric Diatoms Type	Centric Diatoms Cells/in.^{2}	Green Coccoid Type	Green Coccoid Cells/in.^{2}*	Blue-Green Coccoid Type	Blue-Green Coccoid Cells/in.^{2}*	Blue-Green Filamentous Type	Blue-Green Filamentous Cells/in.^{2}	Slime Type	Slime Filaments/in.^{2}*
Barber Rd	58.2	Fragilaria Navicula Melosira Nitzschia Sunedra	1,215,683			Closterium	3,199	Merismopedia	6,398	Oscillatoria	6,398		-0-
Caldwell	21.8	Navicula Nitzschia Diatoma Fragilaria Cymbella	3,213,708									Sphaerotilus	642,741
Notus	13.8	Diatoma Fragilaria Navicula	29,839,500	Stephanodiscus	Q					Oscillatoria	Q	Sphaerotilus	15,472,333
Parma	5.0	Diatoma Fragilaria Navicula Nitzschia	16,490,250									Sphaerotilus	8,114,250

* These are maximum values.

Q = observed in qualitative scan

TABLE G-2
AQUATIC GROWTHS FROM ARTIFICIAL SUBSTRATES, SNAKE RIVER
October 18-November 10, 1971

Location	River Mile	Pennate Diatoms Type	Pennate Diatoms Cells/in^2 Total	Centric Diatoms Type	Centric Diatoms Cells/in^2 Total	Green Coccoid Type	Green Filamentous Type	Green Filamentous Filaments/in^2 Total	Blue-Green Coccoid Type	Blue-Green Filamentous Type	Slime Type	Slime Filaments/in^2 Total
Homedale	416.0(R)	Diatoma Navicula	26,291	Stephanodiscus	65,728	Protococcus Schroederia	Ulothrix	6,572				
Homedale	416.0(L)	Diatoma Navicula Nitzschia	244,300	Stephanodiscus	34,900	Protococcus Schroederia	Ulothrix					
Adrian	401.8(R)	Diatoma Navicula	183,923	Stephanodiscus	65,263							
Adrian	401.8(L)	Cymbella Diatoma Fragilaria Navicula Nitzschia Synedra	691,020	Stephanodiscus	83,760	Schroederia						
Nyssa	389.0(L)	Cymbella Diatoma Fragilaria Navicula Synedra	4,560,266	Stephanodiscus	537,460		Ulothrix		Anoceptis	Oscillatoria	Sphaerotilus	456,026
Ontario	373.0(R)	Cymbella Diatoma Fragilaria Navicula	337,366	Stephanodiscus	118,078		Ulothrix				Sphaerotilus	371,103
Payette	364.0(R)	Navicula Synedra	239,937	Stephanodiscus	63,983		Ulothrix	15,995			Sphaerotilus	351,908
Payette	364.0(L)	Diatoma Fragilaria Navicula Synedra	1,889,544	Stephanodiscus	106,154	Protococcus					Sphaerotilus	997,846
Weiser	350.3(R)	Diatoma Fragilaria Navicula	118,460	Stephanodiscus	20,940							
Weiser	350.3(L)	Diatoma Fragilaria Navicula Synedra	225,119	Stephanodiscus	59,330	Protococcus					Sphaerotilus	65,263

APPENDIX H

FISH

TABLE H-1
ELECTROFISHING RESULTS, BOISE RIVER
(RM 58.2 to 0.1)
October-November, 1971

Fish Taken	Barber Road 391.3/58.2	Strawberry Glen Rd. 391.3/47.1	Middleton 391.3/26.5	Parma 391.3/5.0	Mouth 391.3/0.1
Mountain whitefish	X	X	X		X
Rainbow trout	X	X			
Carp				X	X
Speckled dace	X	X			
Redside shiner	X				
Largescale sucker		X	X	X	X
Mountain sucker	X			X	
Mottled sculpin	X	X			

TABLE H-2
CHECKLIST OF FISHES, BOISE RIVER[a/]
(RM 58.2 to 0.1)

Common Name	Scientific Name
Mountain Whitefish[b/]*	*Prosopium williamsoni* (Girard)
Rainbow trout[b/], [c/]	*Salmo gairdneri* Richardson
Chiselmouth*	*Acrocheilus alutaceus* Agassiz and Pickering
Carp[b/]*	*Cyprinus carpio* Linnaeus
Northern squawfish	*Ptychocheilus oregonensis* (Richardson)
Longnose dace*	*Rhinichthys cataractae* (Valenciennes)
Speckled dace[b/]*	*Rhinichthys osculus* (Girard)
Redside shiner[b/]*	*Richardsonius balteatus* (Richardson)
Tui chub	*Siphateles bicolor* (Girard)
Bridgelip sucker*	*Catostomus columbianus* (Eigenmann and Eigenmann)
Largescale sucker[b/]	*Catostomus macrocheilus* Girard
Mountain sucker[b/]	*Pantosteus platyrhnchus* (Cope)
Brown bullhead	*Ictalurus nebulosus* (LeSueur)
Channel catfish	*Ictalurus punctatus* (Rafinesque)
Tadpole madtom	*Noturus gyrinus* (Mitchill)
Bluegill	*Lepomis macrochirus* Rafinesque
Smallmouth bass	*Micropterus dolomieui* Lacépède
Largemouth bass	*Micropterus salmoides* (Lacépède)
Black crappie	*Pomoxis nigromaculatus* (LeSueur)
Yellow perch	*Perca flavescens* (Mitchill)

TABLE H-2 (Cont.)

CHECKLIST OF FISHES, BOISE RIVER

(RM 58.2 to 0.1)

Common Name	Scientific Name
Mottled sculpin[b]*	*Cottus bairdi* Girard
Columbia sculpin*	*Cottus hubbsi* Bailey and Dimick

[a] List was supplied by William E. Webb, Regional Fishery Biologist, Idaho Fish and Game Department. Common species are marked with an asterisk.

[b] These are collected in EPA survey, November 1971.

[c] Approximately 20,000 catchable size Rainbow trout are stocked annually between Barber Bridge and Star.

TABLE H-3

RAINBOW TROUT FLAVOR TEST RESULTS BOISE RIVER, IDAHO[a]

NOVEMBER, 1971

Station (RM)	Mean Scores[b] Flavor			Desirability		
	Test	Reference	LSD[c]	Test	Reference	LSD[c]
58.2	6.07	6.17	0.39	5.42	5.60	0.51
47.1	4.72[d]	6.17	0.39	3.80[d]	5.60	0.51
33.9	5.80[d]	6.27	0.46	5.52[d]	6.02	0.50
21.8	5.60[d]	6.27	0.46	5.25[d]	6.02	0.50
13.8	6.22	6.27	0.46	6.00	6.02	0.50
5.0	6.37	6.27	0.46	6.10	6.02	0.50

[a] There are 20 judgments per sample.

[b] The score range is: 7, no off-flavor; 1, very extreme off-flavor
7, very desirable; 1, very undesirable.

[c] LSD refers to least significant difference at the five percent level.

[d] The test sample was significantly different from reference.

TABLE H-4

CHECKLIST OF SNAKE RIVER FISHES[a]

(RM 442.5 to 351.3)

Common Name	Scientific Name
White sturgeon	*Acipenser transmontanus* Richardson
Mountain whitefish[b]	*Prosopium williamsoni* (Girard)
Rainbow trout	*Salmo gairdneri* Richardson
Chiselmouth	*Acrocheilus alutaceus* Agassiz and Pickering
Carp[b]	*Cyprinsis carpio* Linnaeus
Peamouth	*Mylocheilus caurihus* (Richardson)
Northern squawfish	*Ptychocheilus oregonesis* (Richardson)
Longnose dace	*Rhinichthys cataractae* (Valenciennes)
Speckled dace	*Rhinichthys osculus* (Girard)
Redside shiner	*Richardsonius balteatus* (Richardson)
Bridgelip sucker[b]	*Catostomus columbianus* (Eigenmann and Eigenmann)
Largescale sucker[b]	*Catostomus macrocheilus* Girard
Brown bullhead	*Ictalurus nebulosus* (LeSueur)
Channel catfish	*Ictalurus punctatus* (Rafinesque)
Tadpole madtom[b]	*Noturus gyrinus* (Mitchill)
Smallmouth bass	*Micropterus dolomieui* Lacépède
Largemouth bass	*Micropterus salmoides* (Lacépède)
Black crappie	*Pomaxis nigromaculatus* (LeSueur)
Mottled sculpin	*Cottus bairdi* Girard

[a] This list was supplied by James C. Simpson, Chief, Fisheries, Idaho Fish and Game Department.

[b] These were collected in EPA survey, November, 1971.

TABLE H-5
RAINBOW TROUT FLAVOR TEST RESULTS SNAKE RIVER, IDAHO[a]
November, 1971

Mean Scores[b]

Station (RM)[d]	Flavor			Desirability		
	Test	Reference	LSD[c]	Test	Reference	LSD[c]
416.0(L)	6.15	6.40	0.52	5.10	5.20	0.71
401.8(L)	5.45	5.90	0.86	4.70	5.20	0.88
401.8(R)	6.10	5.90	0.86	5.50	5.50	0.88
393.0(L)	6.30	5.75	0.70	6.10	5.30	0.85
390.5( )	5.45	5.90	0.86	4.90	5.20	0.88
390.5(R)	4.55[e]	5.90	0.86	3.46[e]	5.20	0.88
387.0(L)	5.90	6.40	0.52	5.25	5.20	0.71
387.0(R)	4.75[e]	5.90	0.86	3.40[e]	5.20	0.88
369.0(L&R)	6.40	6.40	0.52	5.55	5.20	0.71
367.0(R)	6.20	6.40	0.52	5.45	5.20	0.71
364.0(L)	6.40	6.40	0.52	5.60	5.20	0.71
353.9(L)	4.85[e]	5.75	0.70	4.30[e]	5.30	0.85
353.9(R)	5.65	5.75	0.70	5.20	5.30	0.85

TABLE H-5 (Continued)

RAINBOW TROUT FLAVOR TEST RESULTS SNAKE RIVER, IDAHO[a/]

NOVEMBER, 1971

Station (RM)[d/]	Mean Scores[b/] Flavor			Desirability		
	Test	Reference	LSD	Test	Reference	LSD[c/]
350.3(L&R)	6.25	5.75	0.70	6.00	5.30	0.85

[a/] There are 10 judgments per sample.

[b/] The score range is: 7, no off-flavor; 1, very extreme off-flavor
7, very desirable; 1, very undesirable.

[c/] LSD refers to least significant difference at the five percent level.

[d/] The notation concerning left and right is as follows:
(l) left bank, (r) right bank (L&F) left and right bank facing upstream.

[e/] Test sample is significantly different from reference.

APPENDIX I

BENTHOS

TABLE I-1
BENTHOS, INDIAN CREEK
October-November, 1971
(Numbers per square foot)

	Station (River Miles)				
	19.7/11.9	19.7/10.4	19.7/5.0	19.7/2.8	19.7/0.1
FLATWORMS (TURBELLARIA)	4	1,408	2	22	
ROUNDWORMS (NEMATA)				Q	
SLUDGEWORMS (TUBIFICIDAE)	6	440	40,710	23	11
LEECHES (HIRUDINEA)		Q	5		Q
SCUDS (AMPHIPODA)					
Gammarus	4	72	2	1	Q
MAYFLIES (EPHEMEROPTERA)					
Tricorythodes	1	8		Q	
Pseudocleon	2				
Stenonema	1				
DRAGONFLIES (ODONATA)					
Gomphidae	1				
DAMSELFLIES (ODONATA)					
Coenagrionidae	Q	8		1	Q
WATER BOATMAN (CORIXIDAE)	Q				

TABLE I-1 (Cont.)
BENTHOS, INDIAN CREEK
October-November, 1971
(Numbers per square foot)

	Station (River Miles)				
	19.7/11.9	19.7/10.4	19.7/5.0	19.7/2.8	19.7/0.1
CADDISFLIES (TRICOPTERA)					
Hydropsyche	3			2	5
BITING MIDGES (CERATOPOGONIDAE)			9	5	15
BLOODWORMS (CHIRONOMIDAE)	1			5	19
BLACK FLIES (SIMULIIDAE)	6	Q		2	
SNAILS (GASTROPODA)					
Physa	1	8	9	Q	
Gyraulus	Q	8			
Numbers per square foot	33	1,954	40,737	64	53
Number of kinds	14	9	6	11	7

Q = Organisms collected qualitatively; arbitrarily assigned a value of 1 for computations.

TABLE I-2
BENTHOS, BOISE RIVER
October-November, 1971
(Numbers per square foot)

	Station (River Miles)								
	58.2	52.8	47.1	33.9	26.5	21.8	13.8	5.0	0.1
FLATWORMS (TURBELLARIA)							Q		
ROUNDWORMS (NEMATA)	2						71		
SLUDGEWORMS (TUBIFICIDAE)		9	32	8	10	28	779	64	2
LEECHES (HIRUDINEA)			4					2	
SCUDS (AMPHIPODA)			Q		Q	Q	Q	2	
MAYFLIES (EPHEMEROPTERA)									
Baetis	1	30	40	6	4	Q	2	Q	Q
Tricorythodes					4	Q			
Pseudocleon	10	18	Q	15	8	Q		Q	
Stenonema			Q			Q	Q	Q	
Heptagenia	17	3	Q	3	2	11		Q	
Ephemerella	5	5	4						
Rithrogenia			Q						
Ephemera					2	2			
RUE BUGS (HEMIPTERA)									
Corixidae	Q			Q	Q	Q	Q		Q
Macrouliidae						Q	Q	Q	

TABLE I-2 (Cont.)
BENTHOS, BOISE RIVER
October-November, 1971
(Numbers per square foot)

	Station (River Miles)								
	58.2	52.8	47.1	33.9	26.5	21.8	13.8	5.0	0.1
TRUE BUGS (HEMIPTERA) cont.									
Gerridae				Q					
CADDISFLIES (TRICOPTERA)									
Hydropsyche	54	59	1,240	30	300	Q	Q	Q	
Cheumatopsyche		1		36	258	2			
Agraylea	Q								
AQUATIC CATERPILLARS (LEPIDOPTERA)		2	Q	2	10				
CRANEFLIES (TIPULIDAE)		Q	Q			4			2
BITING MIDGES (CERATOPOGONIDAE)							Q	Q	
BLOODWORMS (CHIRONOMIDAE)	119	303	132	86	80	57	460	18	Q
BLACK FLIES (SIMULIIDAE)	30	160		4	4	Q	Q	Q	
HORSE FLIES (TABINIDAE)			8	Q					
SNAILS (GASTROPODA)									
Physa				Q					
Gyraulus					Q				
Numbers per square foot	240	591	1,467	194	685	113	1,320	94	7
Number of kinds	10	11	14	13	14	15	12	12	5

Q = organisms collected qualitatively only; arbitrarily assigned a value of 1 for computations.

TABLE I-3
BENTHOS, SNAKE RIVER
October-November, 1971

	Station (River Miles)													
	442.5	424.0	416.0	401.8	393.0	390.5	389.0	387.0	373.0	369.0	367.0	364.0	353.9	350.3
FLATWORMS (TURBELLARIA)			Q											
ROUNDWORMS (NEMATA)			Q	Q										
SLUDGEWORMS (TUBIFICIDAE)	Q					Q	Q	Q		Q	Q	Q	Q	Q
SOWBUGS (ISOPODA)				Q			Q							
SCUDS (AMPHIPODA)	Q	Q	Q	Q	Q		Q						Q	
MAYFLIES (EPHEMEROPTERA)														
Baetis	Q		Q	Q	Q	Q	Q	Q				Q		Q
Tricorythodes								Q					Q	
Pseudocloeon			Q					Q	Q	Q		Q	Q	
Stenonema			Q	Q					Q			Q		
Heptagenia											Q		Q	
DAMSELFLIES (COENAGRIONIDAE)								Q						
WATER BOATMAN (CORIXIDAE)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
BEETLES (COLEOPTERA)														
Chrysomelidae				Q										
CADDISFLIES (TRICOPTERA)														
Hydropsyche				Q					Q	Q	Q	Q		Q

TABLE I-3 (Cont.)
BENTHOS, SNAKE RIVER
October-November, 1971

	Station (River Miles)													
	442.5	424.0	416.0	401.8	393.0	390.5	389.0	387.0	373.0	369.0	367.0	364.0	353.9	350.3
AQUATIC CATERPILLARS (LEPIDOPTERA)												Q		
BLOODWORMS (CHIRONOMIDAE)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
BLACK FLIES (SIMULIIDAE)														
Simulium		Q	Q	Q			Q	Q	Q	Q		Q	Q	Q
HORSEFLIES (TABINIDAE)	Q													
SOLDIER FLIES (STRATIOMYIIDAE)	Q													
ANTHOMID FLIES (ANTHOMYIIDAE)	Q													
SNAILS (GASTROPODA)														
Physa	Q							Q			Q			
Ferrissia											Q			
Lymnaea		Q	Q											
Ovraulus					Q						Q			
Number of kinds	9	5	10	10	5	4	7	9	6	6	8	9	8	5

Q = Organisms collected qualitatively only

TABLE I-4
BENTHOS, SELECTED TRIBUTARIES OF THE SNAKE RIVER BASIN
October-November, 1971
(Numbers per square foot)

	Station (River Miles)						
	Owyhee	Malheur	Payette			Weiser	
	392.3/2.9	368.5/0.1	365.6/28.0	365.6/4.1	365.6/0.1	351.8/1.0	351.8/0.1
ROUNDWORMS (NEMATA)			4	2			
SLUDGEWORMS (TUBIFICIDAE)	64	12	1	6	11	4	
SCUDS (AMPHIPODA)	Q		Q				
MAYFLIES (EPHEMEROPTERA)							
Baetis	Q						
Tricorythodes					2	2	
Pseudocleon			1	2	Q	Q	Q
Heptagenia			9	14	Q	4	Q
WATER BOATMAN (CORIXIDAE)	Q	Q	Q			Q	
BEETLES (COLEOPTERA)							
Stenelmis						Q	Q
CADDISFLIES (TRICOPTERA)							
Hydropsyche			103	64	2		Q
Lepidostoma					Q		
Agraylea			1	2	4		
AQUATIC CATERPILLARS (LEPIDOPTERA)			1		21		
BLOODWORMS (CHIRONOMIDAE)	4	Q	21	166	186	97	Q
BLACK FLIES (SIMULIIDAE)			Q	4		Q	Q

TABLE I-4 (Cont.)
BENTHOS, SELECTED TRIBUTARIES OF THE SNAKE RIVER BASIN
October-November, 1971
(Numbers per square foot)

	Station (River Miles)						
	Owyhee	Malheur	Payette			Weiser	
	392.3/2.9	368.5/0.1	365.6/28.0	365.6/4.1	365.6/0.1	351.8/1.0	351.8/0.1
SNAILS (GASTROPODA)							
Physa	Q		Q	Q	Q	9	
Numbers per square foot	72	14	145	261	230	120	6
Number of kinds	6	3	12	9	10	9	6

Q = Organisms collected qualitatively only; arbitrarily assigned a value of 1 for computations.

APPENDIX J

DATA FROM WASTE-SOURCE EVALUATIONS

TABLE J-1

SUMMARY OF ANALYTICAL DATA - MUNICIPAL WASTE-SOURCE EVALUATIONS
SNAKE RIVER AND ITS TRIBUTARIES
OCTOBER 18-25, 1971

Map Key	Location and Date Sampled		Flow MGD	BOD Influent mg/l	BOD Effluent mg/l	BOD Effluent lbs/day	COD Influent mg/l	COD Effluent mg/l	TOC Influent mg/l	TOC Effluent mg/l	K_1	NH_3	NO_2-NO_3	Total P mg/l
												mg/l as N		
M-3	Boise, Idaho, City of (RM 391.3/49.1) October 22-25	AVERAGE	11.3	158[a]	27	2,600	243[a]	108	57[a]	30	16.0	13.0	0.08	6.3
		RANGE	10.4-12.0	110-210	16-50	1,390-4,800	170-320	100-120	36-120	16-57	13.0-18.0	11.0-16.0	0.05-0.13	4.7-8.6
M-2	Caldwell, Idaho, City of (RM 391.3/21.3) October 18-21	AVERAGE	4.4	177	57	2,090	167	53	103	36	8.7	7.7	0.79	3.7
		RANGE	4.3-4.4	170-190	50-60	1,830-2,210	100-230	50-60	69-140	29-43	7.0-9.6	6.3-8.6	0.6-1.05	3.3-4.0
M-4	Garden City, Idaho, City of (RM 391.3/48.0/0.8) October 22-25	AVERAGE	0.45	57	37	138	170	37	32	25	3.4	1.7	0.72	1.2
		RANGE	[b]	40-70	30-45	113-169	100-230	30-45	13-66	14-47	2.8-4.2	1.1-2.3	0.70-0.73	1.1-1.4
M-5	Meridian, Idaho, City of (RM 391.3/30.5/16.0) October 22-25	AVERAGE	0.47	87	61	239	103	72	370	135	10.0	7.7	0.45	4.3
		RANGE	0.42-0.50	60-110	32-110	125-431	70-160	42-120	356-385	112-158	8.0-13.0	6.3-10.0	0.42-0.47	3.4-5.0
M-1	Nampa, Idaho, City of (RM 391.3/19.7/7.4) October 21-25	AVERAGE	15.1	499[c]	141[d]	17,400	573[c]	141[d]	187[c]	50[d]	28.0[d]	17.0[d]	0.33[d]	3.1[d]
		RANGE	12.6-17.0			11,750-23,000								
M-6	Ontario, Oregon, City of (RM 368.5/1.0) October 18-21	AVERAGE	2.1	123	8	140	227	137	64	27	7.0	2.3	0.18	2.9
		RANGE	2.0-2.2	70-180	5-13	88-228	140-240	120-170	36-95	22-34	5.4-10.0	2.0-2.5	0.12-0.21	2.2-3.3

a/ Average calculated from concentrations of two influent streams (flow weighted).
b/ Flow measured by Stage recorder on one-day.
c/ Average calculated from concentrations of three influent streams (flow weighted).
d/ Average calculated from concentrations of two effluent streams (flow weighted).

TABLE J-2
SUMMARY OF BACTERIOLOGICAL ANALYSES
MUNICIPAL WASTE DISCHARGES
SNAKE RIVER AND ITS TRIBUTARIES
October 18-25, 1971

Map Key	Location and Date Sampled	Total Coliforms MF Count/100 ml			Fecal Coliforms MF Count/100 ml		
		Maximum	Mean[a]	Minimum	Maximum	Mean[a]	Minimum
M-3	Boise, Idaho, City of (RM 391.3/49.1) October 22-25	220,000	36,000	400	190	63	4
M-2	Caldwell, Idaho, City of (RM 391.3/21.8) October 18-21	51,000	18,000	<100	3,100	1,100	<10
M-4	Garden City, Idaho, City of (RM 391.3/48.0/0.8) October 22-25	>80,000	10,000	4	1,900	486	<4
M-5	Meridian, Idaho, City of (RM 391.3/30.5/16.0) October 22-25	1,700	480	12	20	12	4
M-1	Nampa, Idaho, City of (RM 391.3/19.7/7.4) October 21-25	>8,000,000	1,200,000	350	760,000	96,000	20
M-6	Ontario, Oregon, City of (RM 368.5/1.0)	<100	14	<4	<100	4	<4

[a] Values reported as " < " not included in calculation of mean.

TABLE J-3

FINDINGS OF
MUNICIPAL WASTE SOURCE EVALUATIONS
SNAKE RIVER AND ITS TRIBUTARIES
OCTOBER 18-25, 1971

Map Key	Location	Type of Treatment	Findings
M-3	Boise, Idaho[a/] October 22-25 (RM 391.3/49.1)	Primary treatment followed by conventional activated sludge with sludge thickening. Anaerobic digesters and four sludge lagoons. Chlorine disinfection.	1. Plant provided 84 percent BOD removal. 2. Disinfection was adequate.
M-2	Caldwell, Idaho[a/] October 18-21 (RM 391.3/21.8)	Primary treatment followed by trickling filter and secondary clarifier; anaerobic digesters. Chlorine disinfection.	1. Treatment was inadequate. 2. Disinfection was inadequate.
M-4	Garden City, Idaho[a/] October 22-25 (RM 391.3/48.0/0.8)	Primary treatment followed by trickling filter and secondary clarifier. Chlorine disinfection.	1. Treatment was inadequate. 2. Disinfection was adequate.
M-5	Meridian, Idaho[a/] October 22-25 (RM 391.3/30.5/16.0)	Primary treatment followed by trickling filter and secondary clarifier. Chlorine disinfection.	1. Treatment was inadequate. 2. Disinfection was adequate.

TABLE J-3 (Cont.)

FINDINGS OF
MUNICIPAL WASTE SOURCE EVALUATIONS
SNAKE RIVER AND ITS TRIBUTARIES
OCTOBER 18-25, 1971

Map Key	Location	Type of Treatment	Findings
M-1	Nampa, Idaho[c/] October 21-November 10 (RM 391.3/19.7/7.4)	Pretreatment of industrial wastes. Primary treatment followed by trickling filters and secondary clarifier. Chlorine disinfection.	1. Treatment was inadequate. 2. Disinfection was inadequate.
M-6	Ontario, Oregon[d/] October 18-21 (RM 368.5/1.0)	Four lagoons operated in series. Chlorine disinfection.	1. Treatment was adequate. 2. Disinfection was adequate.

a/ Receiving stream: Boise River.
b/ Receiving stream: Drain to Boise River.
c/ Receiving stream: Indian Creek.
d/ Receiving stream: Malheur River

TABLE J-4

SUMMARY OF ANALYTICAL DATA - EFFLUENTS FROM INDUSTRIAL WASTE SOURCES
SNAKE RIVER AND ITS TRIBUTARIES
OCTOBER 18-NOVEMBER 8, 1971

Map Key	Name of Industry, Location and Dates Sampled		Flow MGD	pH [a] S. U.	Temp. [a] °C	Cond. [a] µmhos/cm	BOD mg/l	BOD lbs/day	COD mg/l	TOC mg/l	K_j mg/l as N	NH_3 mg/l as N	$NO_2 - NO_3$ mg/l as N	Total P mg/l
I-4	Amalgamated Sugar Company Nyssa, Oregon (RM 389.0) October 18-21													
	CSF Discharge	AVERAGE	0.36				148	444	117	73	18	10	1.7	0.51
		RANGE	0.32-0.40	7.9-8.4	34-43	575-800	100-220	300-587	110-130	59-85	16-19	8.2-12	0.8-2.1	0.08-0.73
	Cooling Water Discharge	AVERAGE	4.9				63	2,575	37	14	4.2	3.4	0.85	0.15
		RANGE	2.8-5.0	8.2-8.4	39-50	575-825	<10-90 [b]	417-3,750	18-65	9-22	3.4-5.0	2.8-3.8	0.68-1.00	0.09
	Main Sewer Discharge	AVERAGE	0.96				1,280	10,200	1,890	667	37	15	1.23	0.34
		RANGE	0.34-1.36	8.7-10.3	30-37	100-4,000	700-2,400	5,604-19,200	1,050-3,200	400-980	33-42	11-18	0.07-2.61	1.4-6.7
I-2	Armour Meat Packing Company Nampa, Idaho (RM 391.3/19.7/11.4) October 18-21													
	Waste Treatment Lagoon Effluent	AVERAGE	0.27 [c]		10 [c]		35 [c]	79 [c]	81	51	44	21	0.05	7.4
		RANGE		7.1-7.6		1,000-2,600			68-100	40-68	38-47	19-22	<0.05-0.05	6.9-7.6
	Cooling Water Effluent	AVERAGE	0.5 [d]				3.2	13	7.3	6	<0.2		2.84	0.05
		RANGE		7.5-7.7	19-22	1,000-1,600	0.5-5	2.1-21	4.5-12	<5-6	<0.1-0.3		2.57-3.15	0.02-0.07
I-6	Boise Cascade Company Emmett, Idaho (RM 365.6/3.3) October 23-25													
	Log Pond Discharge	AVERAGE	5.3 [d]				3.3	146	16	4	<0.1 [c]	<0.1 [c]	0.06	0.04
		RANGE		6.4-6.7	10-12	50-80	2-5	88-221	9-23	3-4			0.05-0.07	0.02-0.05
	Glue Line Effluent	AVERAGE	0.029 [c]				497	120	680	179	2.4	0.8	0.05 [c]	2.3
		RANGE		5.6-6.8	29-39	90240	92-860	22-208	130-1,140	26-310	0.3-5.0	0.2-1.6		0.3-4.6

TABLE J-4 (Cont.)

SUMMARY OF ANALYTICAL DATA - EFFLUENTS FROM INDUSTRIAL WASTE SOURCES
SNAKE RIVER AND ITS TRIBUTARIES
OCTOBER 18-NOVEMBER 8, 1971

Map Key	Name of Industry, Location and Dates Sampled		Flow MGD	pH S. U.	Temp. °C	Cond. µmhos/cm	BOD mg/l	BOD lbs/day	COD mg/l	TOC mg/l	K_j mg/l as N	NH_3 mg/l as N	NO_2 - NO_3 mg/l as N	Total P mg/l
I-5	ORE-IDA Foods, Inc. Ontario, Oregon (RM 370.0) October 18-20 and November 1-3													
	Waste Treatment Lagoon Effluent	AVERAGE	1.72				347	4,980	463	206	54	23	0.15	12.1
		RANGE	1.55-1.96	7.3-7.7	7-12	1,500-2,000	140-700	2,010-10,040	100-1,100	89-280	49-6.3	18-25	0.05-0.21	10.3-14.0
	Cooling Water Effluent	AVERAGE	1.87				8.7	132	15.4	8	0.24	0.17	1.04	0.16
		RANGE	1.75-1.96	7.4-8.4	7-23	1,000-1,450	5-15	76-228	7.4-27	4-11	<0.1-0.5	<0.1-0.5	0.74-1.50	<0.02-0.36
I-1	J. R. Simplot Company Caldwell, Idaho November 4-8 (RM 391.3/17.6)	AVERAGE	4.3				820	30,800	1,000	270	32	18	0.11	10.1
		RANGE	3.7-4.9	6.3-6.7	9-12	1,100-1,350	500-1,500	15,300-60,700	640-1,370	110-370	30-34	15-22	<0.05-0.17	9.1-10.6
I-3	Triangle Dairy Boise, Idaho (RM 391.3/57.7/1.5) October 23-25	AVERAGE	0.06				60[e]	29[e]	87	12	3.8	0.6	0.13	4.8
		RANGE	0.04-0.09	7.2-7.5	5[c]	200-230			81-90	7-17	2.3-5.4	0.3-1.0	<0.05-0.20	4.3-5.3

a/ Measurements are made from grab samples.
b/ Value of <10 is not included in calculating the average concentration or load.
c/ All values are equal.
d/ This is a Company estimate.
e/ This is a single value.

TABLE J-5
SUMMARY OF BACTERIOLOGICAL ANALYSES
EFFLUENTS FROM INDUSTRIAL WASTE SOURCES
SNAKE RIVER AND ITS TRIBUTARIES
October 18-November 8, 1971

Map Key	Name and Dates Sampled	Total Coliforms MF Count/100 ml			Fecal Coliforms MF Count/100 ml		
		Maximum	Mean[a/]	Minimum	Maximum	Mean[a/]	Minimum
I-4	Amalgamated Sugar Company, Nyssa, Oregon (RM 389.0) October 18-21						
	CSF Discharge	19,000	3,300	250	3,100	1,000	160
	Cooling Water Discharge	51,000	14,000	<100	4,700	1,400	<10
	Main Sewer Discharge	760,000	410,000	<100	33,000	17,000	<100
I-2	Armour Meat Packing Company, Nampa, Idaho (RM 391.3/19.7/11.4) October 18-21	25,000	17,000	5,000	4,700	3,800	2,800
I-5	Ore-Ida Foods, Inc., Ontario, Oregon (RM 370.0) November 1-3	21,000,000	3,900,000	<100	890,000	140,000	40,000
I-1	J. R. Simplot Company, Caldwell, Idaho (RM 391.3/17.6) November 4-8	4,200,000	1,500,000	260,000	82,000	64,000	40,000
I-3	Triangle Dairy, Boise, Idaho (RM 391.3/57.7/1.5) October 22-25	>8,000,000	3,300,000	3,700	30,000	7,700	40

[a/] Values reported as " < " not included in calculation of mean.

TABLE J-6

FINDINGS OF
INDUSTRIAL WASTE SOURCE EVALUATIONS
SNAKE RIVER AND ITS TRIBUTARIES
OCTOBER 18-NOVEMBER 8, 1971

Map Key	Name and Date Sampled	Type of Treatment	Findings
I-4	Amalgamated Sugar Company[a/] Nyssa, Oregon October 18-21 (RM 389.0)	Flume water recycled. Lime wastes to non-overflowing lagoon. CSF wastes, process wastes, and cooling waters discharged without treatment.	The plant discharges 6.2 mgd of untreated wastewaters, containing 13,800 lb BOD, a violation of Oregon Water Quality Standards.
I-2	Armour Meat Packing Company[b/] Nampa, Idaho October 18-21 (RM 341.3/19.7/11.4)	Two-cell lagoon for process wastes. Boiler blowdown water, condenser steam, and ammonia condenser water discharged without treatment.	Treatment is inadequate.
I-6	Boise Cascade Company[c/] Emmett, Idaho October 23-25 (RM 365.8/32.3)	Cooling water to log pond then to the Payette River. Steam vat discharged without treatment.	The plant discharges 0.029 mgd of untreated wastewaters containing 120 lb BOD, a violation of Idaho Water Quality Standards.
I-5	ORE-IDA Foods, Inc.[c/] Ontario, Oregon October 18-November 3 (RM 370.0)	Process wastes through primary clarifiers followed by two-cell lagoon operated in series.	Treatment is inadequate.

TABLE J-6 (Cont.)

FINDINGS OF
INDUSTRIAL WASTE SOURCE EVALUATIONS
SNAKE RIVER AND ITS TRIBUTARIES
OCTOBER 18-NOVEMBER 8, 1971

Map Key	Name and Date Sampled	Type of Treatment	Findings
I-1	J. R. Simplot Company[d/] Caldwell, Idaho November 4-8 (RM 391.3/17.6)	Process wastes through primary clarifier followed by five-cell lagoon operated in series.	1. Treatment is inadequate. 2. Water quality of the Boise River is degraded by the discharge.
I-3	Triangle Dairy[e/] Boise, Idaho October 23-25 (RM 391.3/57.7/1.5)	Two-cell lagoon.	Plant does not provide adequate disinfection and BOD removal.

a/ Receiving stream: Snake River.
b/ Receiving stream: Indian Creek.
c/ Receiving stream: Payette River.
d/ Receiving stream: Boise River.
e/ Receiving stream: Drain to Boise River.

APPENDIX K

EFFLUENT GUIDELINES
FOR
INDUSTRIAL WASTEWATER DISCHARGES

EFFLUENT GUIDELINES
FOR
INDUSTRIAL WASTEWATER DISCHARGES

The proposed waste load limitations for the industries evaluated have been summarized.

A. ARMOUR MEAT PACKING COMPANY

1. The BOD discharged shall not exceed 0.17 lb/1,000 lb LWK, or 165 lb/day, whichever is less.

2. The suspended solids discharged shall not exceed 0.23 lb/1,000 lb LWK, or 110 lb/day, whichever is less.

3. The BOD and the suspended solids concentration shall not exceed 10 mg/l each, as the average of 24-hour composite samples collected over any 14-day discharge period. Final effluent concentrations shall not exceed 15 mg/l for more than 10 percent of the 24-hour composite samples or 20 mg/l for any single sample.

B. J. R. SIMPLOT COMPANY, CALDWELL, IDAHO

Because of low-flow conditions in the Boise River at the point of discharge, treatment levels must be more stringent than those attainable by best practicable control technology. The following time schedule and limitations are required.

1. By December 31, 1973 -

BOD and TSS - maximum concentration 400 mg/l and ten-day average loading 13,000 lb/day* (5.8 lb/ton)**

Ammonia - maximum concentration 10 mg/l (0.3 lb/ton)**

Temperature - no more than 5° F above receiving water temperature

* It is not to exceed this value by 20 percent on any single day.
** This value is based on present production.

Odor - undetectable in the receiving water

2. By December 31, 1974 -

BOD and TSS - maximum concentration 120 mg/l and ten-day average loading 2,000 lb/day* (0.9 lb/ton)**

Turbidity - less than five Jackson Turbidity Units above natural background level of receiving water

Ammonia - 5.0 mg/l (0.15 lb/ton)**

Flow should be continuous and should not exceed 8.5 mgd, or 1/20th the flow of the Boise River, whichever is less. At the 7-day, 10-year low flow of the Boise River, 120 cfs, the discharge volume may be limited to as little as 3.9 mgd.

C. THE AMALGAMATED SUGAR COMPANY, NYSSA, OREGON

1. The BOD discharged shall not exceed 0.5 lb/ton of beets processed or 3,300 lb/day, whichever is less.

2. The suspended solids shall not exceed 0.5 lb/ton of beets processed or 3,300 lb/day, whichever is less.

3. The pH shall be maintained in a range of between 6.0 to 8.5.

4. No toxic or hazardous material, as designated under the provisions of Section 307 of the Federal Water Pollution Control Act as amended, or known to be hazardous or toxic by the permittee, shall be discharged except with the approval of the Administrator (EPA) or his designee.

5. No discharge shall be made which may either cause toxic or hazardous conditions or accelerate eutrophication in the receiving water, except with the approval of the Administrator (EPA) or his designee.

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* It is not to exceed this value by 20 percent on any single day.
** This value is based on present production.

D. ORE-IDA FOODS, INCORPORATED, ONTARIO, OREGON

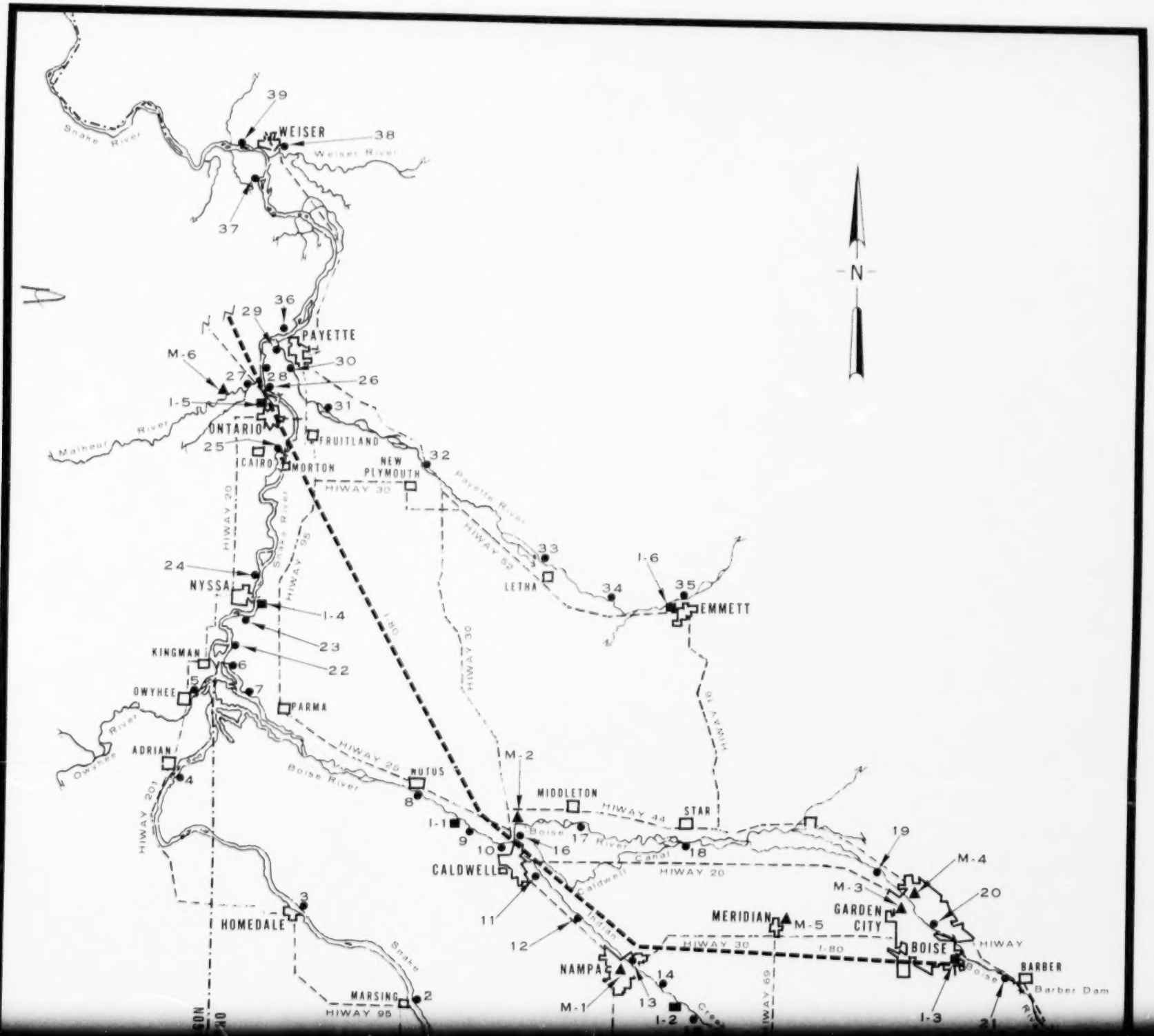
Effective by September 1, 1974:

1. Biochemical oxygen demand discharged shall not exceed 2.4 lb/ton of potatoes and onions processed, or 0.8 lb/ton of corn processed, with the total waste load not to exceed 2,000 lb/day, whichever is less.

2. Total suspended solids discharged shall not exceed 1.6 lb/ton of potatoes and onions processed, or 1.1 lb/ton of corn processed.

3. Chemical oxygen demand discharged shall not exceed 8.8 lb/ton of potatoes and onions processed, or 5.3 lb/ton of corn processed.

4. No discharge which may either cause toxic or hazardous conditions or accelerate eutrophication in the receiving water, except with the approval of the Regional Administrator (EPA) or his authorized representative.


WEISER
Snake River
Weiser River
PAYETTE
ONTARIO
Malheur River
CAIRO
MORTON
FRUITLAND
NEW PLYMOUTH
HIWAY 30
Payette River
HIWAY 52
LETHA
EMMETT
HIWAY 20
Snake River
HIWAY 95
NYSSA
I-4
KINGMAN
OWYHEE
Owyhee River
PARMA
ADRIAN
HIWAY 201
HIWAY 26
Boise River
NOTUS
I-84
HIWAY 30
HIWAY 19
MIDDLETON
HIWAY 44
STAR
I-1
CALDWELL
Boise River
Caldwell Canal
HIWAY 20
MERIDIAN
M-5
GARDEN CITY
M-3
M-4
BOISE
I-80
HIWAY
HOMEDALE
Snake
NAMPA
M-1
I-2
MARSING
HIWAY 95
HIWAY 69
BARBER
Barber Dam
I-3
N
A
A-4

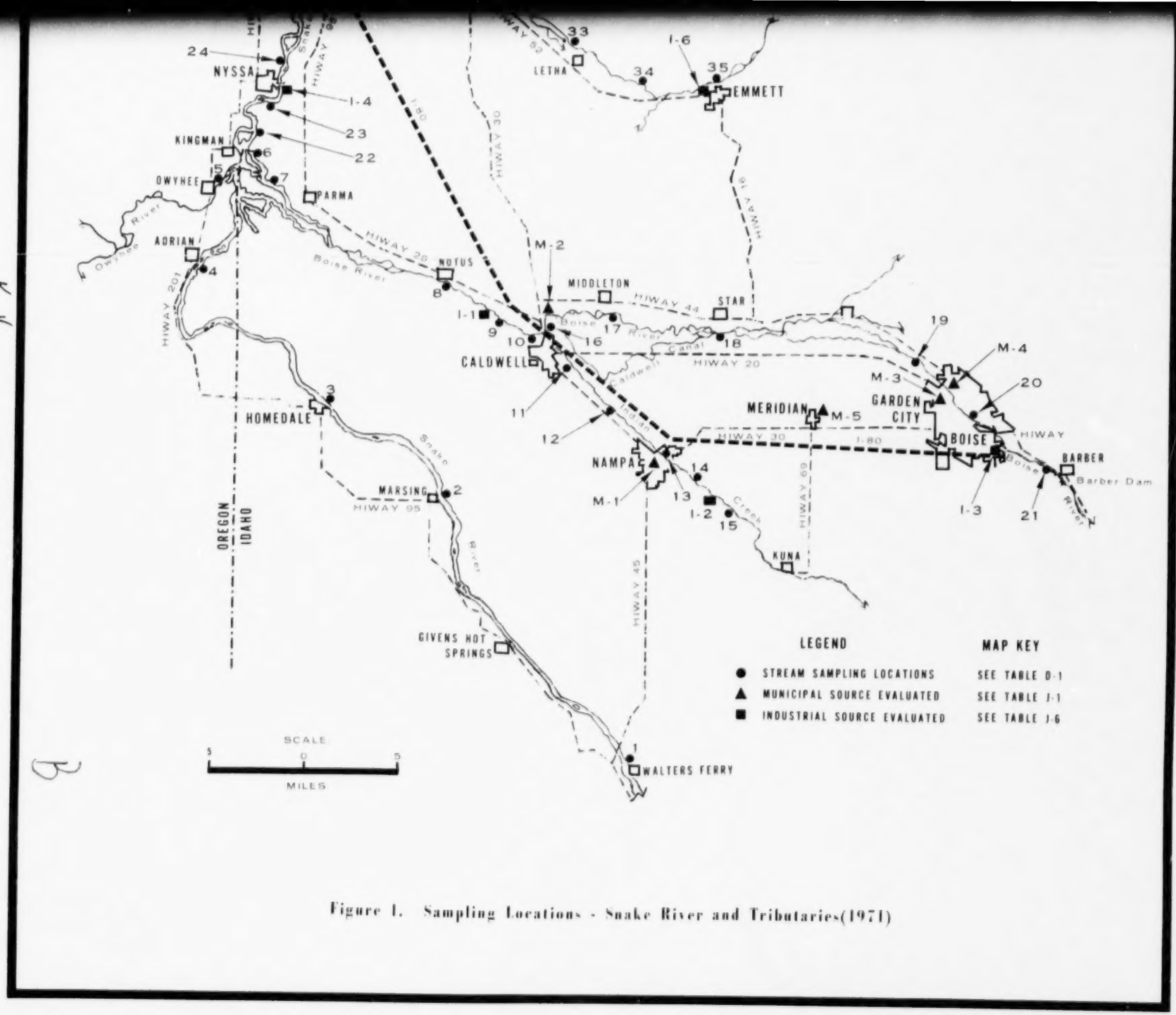


Figure 1. Sampling Locations - Snake River and Tributaries(1971)